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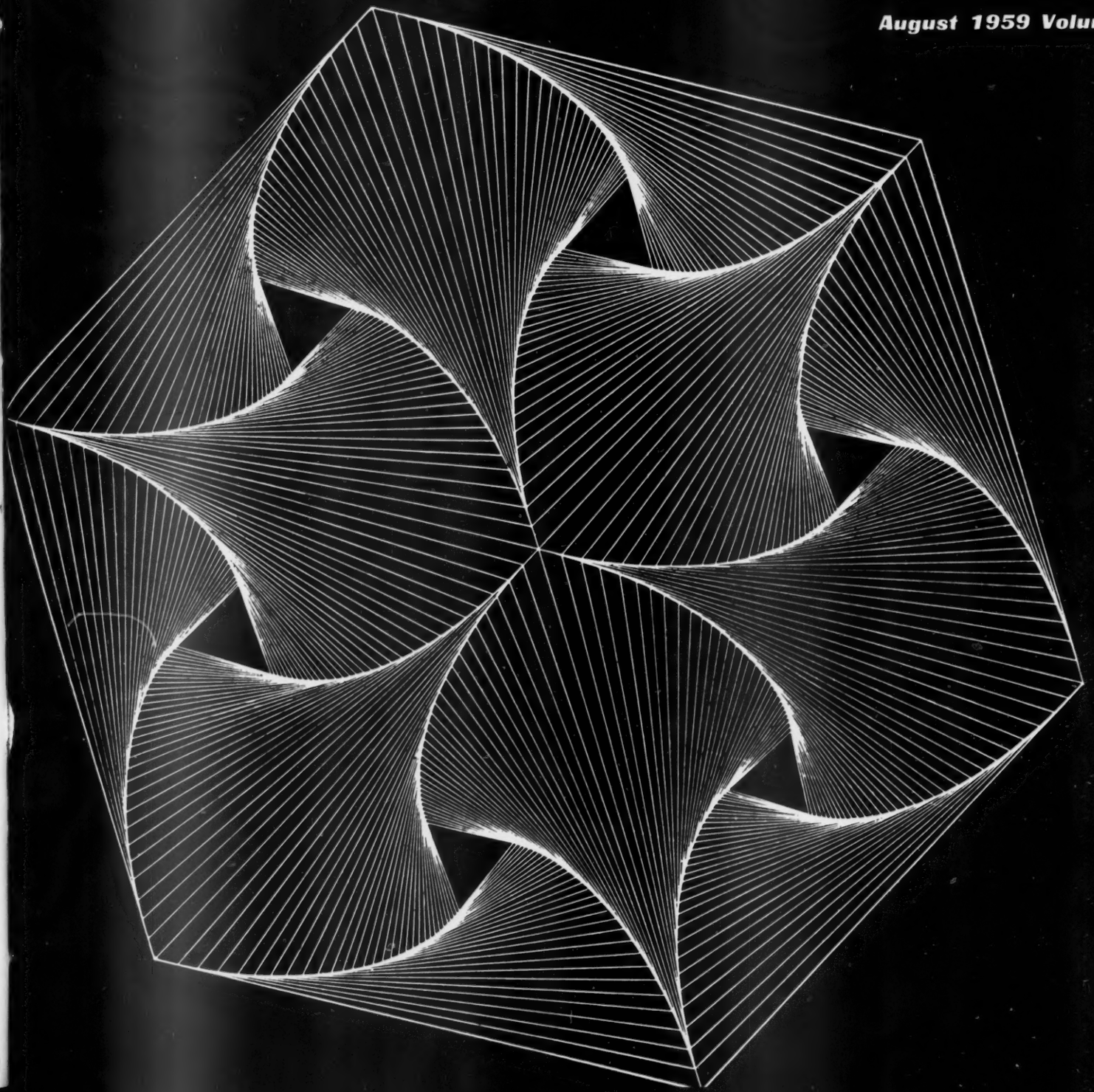
NEWS

August 1959 Volume 1 Number 8



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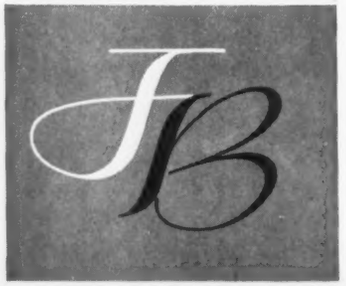

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This month's cover by Tony Palladino represents a mathematical construction in which only triangles were drawn, yet in which parabolic shapes emerge typifying the infinite structural variations possible today in architecture. Palladino, is our guest designer while Bob Gill is in Spain functioning as art director for a forthcoming Hollywood movie. From there, Gill will go to London to produce a film, starring Bea Lillie, based on his forthcoming book, "The Millionaires" to be published this fall by Simon and Schuster.

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forecast

Gold Medalist Walter Gropius, FAIA, delivering acceptance speech at Delgado Museum, New Orleans.

AIA President John Noble Richards, FAIA, (standing left) opens convention. Other speakers included Edward Durell Stone, FAIA, (center) and New Orleans Mayor de L.S. Morrison (right) Bottom photo: all sessions of convention were well-attended by architects and their guests.

AN APPRECIATION

Historic New Orleans provided the setting for one of the AIA's most stimulating, well-attended and thought-evoking conventions in recent Institute history. It was a convention at which opinion *was heard. It was a convention which raised new perspectives for a maturing, enriched profession, in which it did not hesitate to openly criticize itself as well as to claim its privileges and perogatives in the development of this nation's culture . . . and it was a convention which heard Walter Gropius, world famous architect and professor emeritus of Harvard University state the role of the architect in sublime, eloquent language.*

This appreciation is of a convention that is past *. . . but the thinking, the intellectual groundswell of emotional ferment is a* forecast *and a* foreshadowing *of those moments that are yet to be experienced in the growth of the architectural profession. The reader may gain his own insights from our abstract, which follows, of many of the panels and speeches of this splendid meeting in New Orleans.* *JJC*

This moment of history

". . . We stand at a moment in history that calls for a bold, imaginative interpretation of the democratic idea. Our generation is presented with a similar challenge as were the founders of our Western culture, the Greeks, when they deliberately buried the treasures and temples of their former existence under the triumphant symbol of their newly-found freedom: the Acropolis. Or, as Thornton Wilder has put it beautifully: 'Culture under a democracy has its dangers, but also its hopes and promises. Here a new and tremendous theme opens up which has to be penetrated by thought, investigated and expressed, the theme: Man with head unbowed. Democracy has the new task to create new myths, new metaphors, new images to show forth the state of new dignity which man has entered upon.' Only when a social or spiritual goal has become thus clearly identified in the mind of a society does it become the inner substance of its works of art and architecture. There are certainly good omens on the horizon indicating that our country has begun to see the great task before us more clearly, and that the American architect has started to take the lead in the search for new answers to the challenging modern demands in planning and building."

remarks from acceptance speech, AIA Gold Medal Award, by Walter Gropius, FAIA June 25, 1959.

20th Century Renaissance

"As we view our cities, towns, villages and our countryside, I am afraid we must acknowledge that we are a people who have not yet learned to appreciate beauty and, in fact, in this era of prosperity and overabundance we can afford everything *but* beauty.

"It is understandable that time has been required to pioneer and develop this continent and at the same time perfect a successful system of democratic government, and in the fabulous success of achieving these, our efforts have been rewarded by world leadership.

"If history repeats itself, we are now on the eve of a period of the revival of cultural and spiritual values, and we as a group can be the catalysts and the leaders in this 20th Century Renaissance.

". . . We, the architects, are the logical leaders and educators.

"Assuming hopefully that in one generation our people could be educated to appreciate and require more beautiful surroundings, we are in a desperate minority to even approximate the task.

"It is a tragic paradox that designing and planning are the most important and still the least expensive part of any project, and yet are not considered indispensable.

"Without being money-changers in the temple or going on strike, *we must change all of this.*

". . . Leadership in community and city planning has been lost to others and we are called in after the important decisions are made, and our role is to work out the details. Compared to the medical profession, we must again be the diagnosticians, rather than ambulance chasers."

from "Design"—Keynote Address by Edward Durell Stone, FAIA June 23, 1959

The architect's task

". . . To organize space, then, to bring harmony and order and livability into our environment is a task of the architect. The means of achieving this is design.

". . . Building a fitting environment for our people is only in part a problem of planning and architectural design. It is also very largely a matter of financing, organization, proper zoning regulations, modern building codes, and many other matters. It is, in short, a political problem which requires the support of all citizens. It requires your support.

". . . So many of our social problems—juvenile delinquency, blight and slums are problems of environment. If we succeed in improving our environment, we will have succeeded in improving our civilization—in creating the kind of American we must create if we are to gain the respect and loyalty of nations abroad.

"For if democracy fails to provide for its citizens a good life, in a healthy environment, democracy will have failed period.

"This is why I believe that the architect's job is a job of vital importance to all of us."

Speech by John Noble Richards, FAIA President of the AIA to New Orleans Kiwanis Club June 23, 1959

Individual theories / Pereira

"Certainly one of the primary responsibilities of our profession is to meet and solve the specific problems—of space, of function, of economics—implicit in an architectural assignment. But just as surely architecture is something more than the solution, however inspired, of these problems. Design must be something more than the answer to a giant crossword puzzle.

"Yet, in fear or indolence, we have chosen to become problem-solvers rather than accept the greater and infinitely more difficult challenge of creating design in which these problems would be naturally resolved.

". . . What is this 'problem syndrome' that seems to affect our entire profession today? When Michelangelo was confronted with the 'problem' of painting the ceiling of the Sistine Chapel, he did not let the forced perspective determine the subject matter of his frescoes. When Shakespeare wrote his sonnets he did not start with the 'problem' of meter and rhyme scheme and contrive his poetry to fit: if he had, it would not be poetry. And when an architect lets the mechanical requirements of a job determine his design, it is not, I contend, architecture.

"In summary, I feel that as architects we must return to the concept of 'image design' rather than 'problem-design.' We must not be afraid to entertain visions. We must stop thinking of ourselves as so many little black boxes into which, at one end, problems are fed and, at the other, solutions are ground out. We must recognize the fact that design is not the sum of many parts, gift-wrapped in glass and steel, but a total inevitable image."

Panel discussion of Individual Theories of Design by William L. Pereira, FAIA June 24, 1959

Total design

"Total design, as it applies to architects and architecture, can be divided into four categories: (1) education, (2) creative forces, (3) continuity through architecture, and (4) preservation.

"Education: In the First Century B.C., Marcus Vitruvius Pollio, Architect for the Roman Emperor Augustus, wrote a learned treatise on architecture. The keystone of his teaching to the would-be architect was, 'Acquaint yourself with all knowledge.' (*Continued on page 39*)

gazette

Robert W. Cutler, past president of the AIA New York Chapter, was elected vice-president of the *Building Research Institute* of the National Academy of Sciences.

L. Bancel LaFarge, FAIA, re-elected President of AIA New York Chapter. Also re-elected were: Robert Carson, AIA, Vice-President; Gillet Lefferts, Jr., AIA, Secretary; and Michael M. Harris, AIA, Treasurer. Lathrop Douglass, AIA, and Charles S. Haines, II, AIA, were elected members of the executive committee.

Wallace Waterfall, Secretary, Acoustical Society of America, elected Vice-Chairman of Acoustical Standards Board of the American Standards Assn.

John Zerbe appointed assistant to the director of National Lumber Mfrs. Association's Technical Services Division. Among other duties, Zerbe will manage association's educational activities, including the distribution of material designed to encourage top high school graduates to seek careers in forest products industries, and the dissemination of technical data on wood to architectural and engineering schools.

David Lance Jones, Webster Groves High School senior, and Theodore Popowchak, senior at Southwest High School, are the winners of $1,000.00 college scholarships in Architectural or Civil Engineering, awarded by Mississippi Valley Structural Steel Co.

Frank A. Marston named official nominee for President of the American Society of Civil Engineers, at meeting of the Board of Direction.

Nathaniel A. Owings, AIA, elected a trustee of the Committee for Economic Development.

American Society of Civil Engineers awarded its Research Fellowship, with grant of $5,000, to Robert W. Gerstner, instructor in civil engineering at Northwestern University. The Freeman Fellowship, with $3,000 grant, was awarded to Willard E. Fraize, graduate student in mechanical engineering at MIT.

Kenneth D. Cummins, formerly associate professor of civil engineering, University of Detroit, appointed Technical Director of American Concrete Institute.

Official AIA delegates to the U.I.A. Congress in Lisbon will be Henry S. Churchill, FAIA, Ralph Walker, FAIA, Samuel Cooper, FAIA, and John Fugard, FAIA. The meetings will take place September 20-26.

Lawrence K. Murphy, PE, appointed District Engineer for New England by The Asphalt Institute.

Office announcements

Howard D. Fiedler, Registered Architect, announces removal of his office to 2312 Hillcrest Ave., Orlando, Fla.

Robson & Woese, Inc., Consulting Engineers, to 315 Alexander St., Rochester 4, N. Y.

R. Douglas Warner and Raymond J. Brejcha, Architects, to 18154 Harwood Ave., Homewood, Ill.

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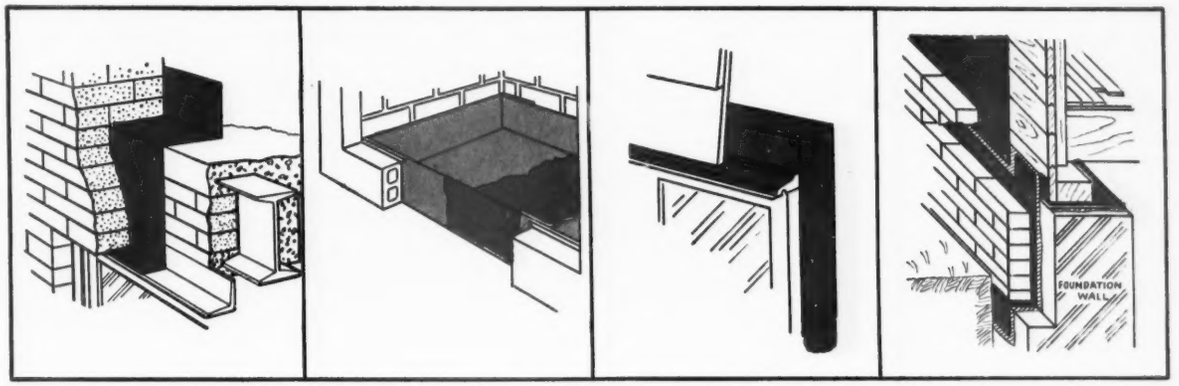

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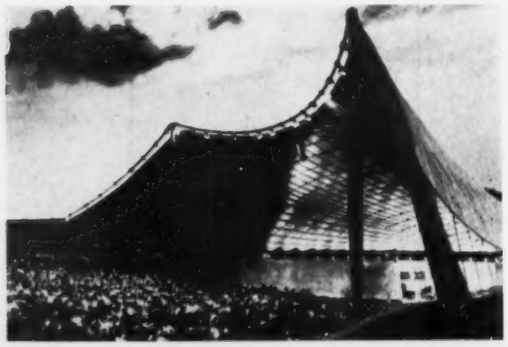
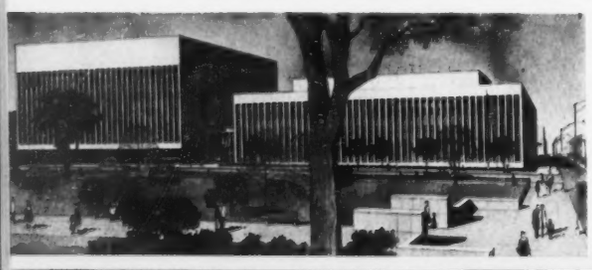
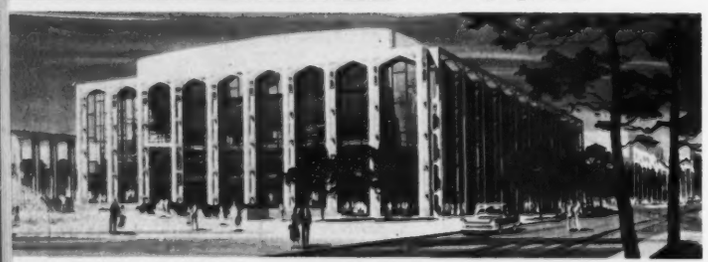


Melbourne's Sidney Meyer Bowl (top photo) was selected by an AIA jury to receive 1959 R. S. Reynolds Memorial Award. Jury (above) consisted of: William W. Caudill, AIA, John Noble Richards, FAIA, Robert E. Alexander, FAIA, Earo Saarinen, FAIA, and Carlos Contreras of Mexico. Brooklyn's new $15 million six-story structure (below) for U.S. Courts and a companion building of four floors for Federal Office use feature limestone and granite exterior materials. Architect: Carson & Lundin and Lorimer Rich & Associates. (Rendering: Jacoby). The $9.8 million Philharmonic Hall (bottom photo) of the Lincoln Center for the Performing Arts will serve as the new home of the New York Philharmonic when completed in 1961. Architects: Harrison & Abramovitz. (Rendering: Schwartz)





AIA convention review

Over 2,000 delegates and visitors assembled in New Orleans for the 91st annual convention of *The American Institute of Architects*. All business meetings and panel discussions were packed with attentive audiences. This year, the convention stressed the theme of "Design" and presented as its keynote speaker, Edward Durell Stone, FAIA. Stone called for an AIA program which would fulfill the historic and aesthetic destiny of the architectural profession in this country. He stated that architects must band together "to create a beautiful physical heritage for our time and for generations to come."

Some of the profession's most celebrated designers were presented in a spirited panel on "Individual Theories of Design." These included Minoru Yamasaki, AIA, of Birmingham, Mich., William L. Pereira, FAIA, and Paul Thiry, FAIA, West Coast practitioners, and Philip C. Johnson, AIA, associated with Mies Van der Rohe in the design of the Seagram Building.

At impressive ceremonies at the Delgado Museum, internationally-famed architect and Harvard professor-emeritus, Walter Gropius, FAIA, received the Institute's highest honor, The Gold Medal. In his acceptance speech, Gropius told his distinguished audience that architects and their profession must educate the whole population in aesthetics, enabling it to "develop a sense of beauty, a sense of the eye." In addition to the presentation to Gropius, investiture ceremonies were held in which 39 members of the Institute were advanced to the rank of Fellow.

During the week of the convention, presentation of awards to builders and architects were made for 20 houses cited for honors in the *1959 Homes for Better Living Program* of the AIA.

Also the AIA announced the conferring of the $25,000 *Reynolds Memorial Award for 1959* on an Australian architectural firm for designing the Sidney Myer Music Bowl in Melbourne, Australia.

A distinguished jury which considered 52 entries from the United States and 11 other countries awarded the prize to the Australian firm of Yuncken, Freeman Brothers, Griffiths and Simpson of Melbourne. The special AIA jury "enthusiastically selected the Music Bowl as the most significant work of architecture selected, in the creation of which, aluminum has been an important contributing factor," according to an AIA statement.

In a joint statement issued by the *AIA's Board of Directors* and the *National Trust for Historic Preservation* an appeal and recommendation has been made to the nation that sixteen of the late Frank Lloyd Wright's buildings be preserved in their original form as important landmarks in American architectural history. The AIA resolution noted and praised the late Frank Lloyd Wright as "undoubtedly the greatest architect of all time."

The close of convention business saw the re-election of John Noble Richards, Toledo, Ohio, as President; Philip Will, Jr. of Chicago, First Vice-President; Henry L. Wright of Los Angeles, Second Vice-President; J. Roy Carroll, Jr. of Philadelphia, Secretary; and Raymond S. Kastendieck of Gary, Ind., Treasurer. In addition six new Regional Directors were elected.

NSPE convention

The Silver Anniversary Convention of the *National Society of Professional Engineers*, recently held in New York City, brought together over 10,000 conferees and visitors in a series of meetings in which the future relationships of the roles of the engineer and scientist were discussed.

Dr. Clark A. Dunn, PE, head of the 49,000 member professional society said that the "really serious and long-range engineering manpower problem in this country is that of developing a greatly increased number of engineers with graduate degrees. . . . Today, too many of our engineering schools are continuing to make rigid distinctions between engineering specialties which are rapidly vanishing at the undergraduate level."

He emphasized that the "traditional differences between such fields as mechanical, electrical, civil and aeronautical engineering are no longer valid as the criteria for setting the pattern for our entire undergraduate program in engineering education."

Competitions/exhibits

The Seventh Annual Industrial Landscaping Awards competition is

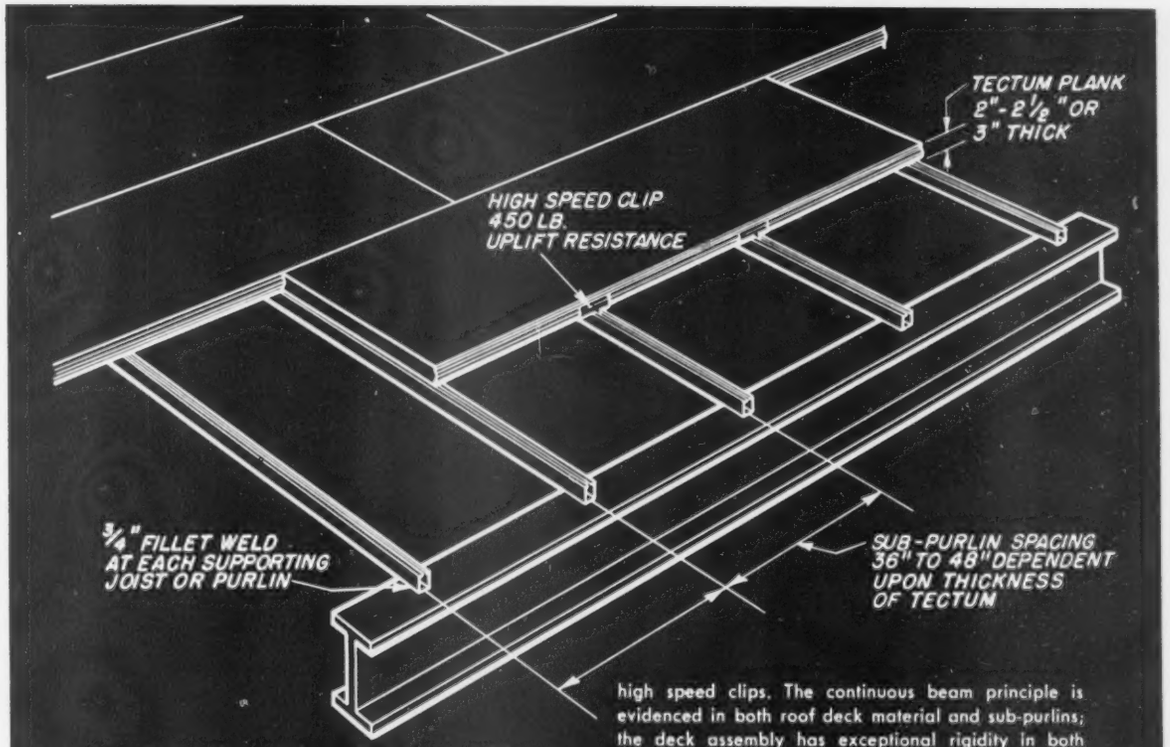
announced by the American Assn. of Nurserymen. Entries must be received by September, 1959. Information describing the rules of entry and awards may be had from Dr. Richard P. White, American Assn. of Nurserymen, 635 Southern Building, Washington 5, D.C.

The San Francisco Museum of Art, War Memorial Building, San Francisco Civic Center, announces an architectural exhibit entitled *Two Buildings: San Francisco—1959.* The exhibit will be held from August 21 through September 20 and will introduce the Crown Zellerbach and John Hancock Buildings to the people of San Francisco by means of visual aids and architectural models. Both buildings were designed by the San Francisco office of Skidmore-Owings-Merrill, the Crown Zellerbach Building in association with Hertzka & Knowles. The exhibit will move to the Portland, Ore., Museum of Art and open there October 8.

A geodesic dome of translucent plastic and an aluminum "space frame," both designed by the mathematician-philosopher-engineer R. Buckminster Fuller, will be erected in the *Museum of Modern Art* outdoor exhibition area in New York City. Arthur Drexler, Director of the Museum's Department of Architecture and Design, stated that the unusual structural exhibit will remain on view throughout the summer.

Education/scholarships

Eighteen architectural and engineering students will supplement their academic studies with "on-the-job" training during the *Fifth Annual Student Training Program* which started on June 15 in the New York architectural firm of Voorhees Walker Smith Smith and Haines. The program, 10 weeks in duration, consists of assignments in the various departments of the firm including architectural design, mechanical, structural and electrical engineering as well as site planning and interior design. Partners and departmental chiefs of the firm conduct specially prepared seminars. When this year's sessions close in August, 100 students will have participated in the program, believed to be the only one of its kind in the country. Those attending the 1959 session come from 17 professional schools.



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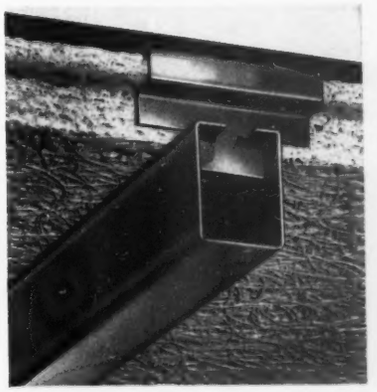

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Wood: present & future

One of the richest and most traditional materials in architecture is wood. It is constantly being adapted to new structural innovations. The use of Y-shaped laminated wood structural bents, pin-connected at the ridge, shown in the upper right photo of the Manor Elementary School in Fairfax, California. Architect: John Lyon Reid, FAIA and Partners of San Francisco. (Photo by Roger Sturtevant.) Among unusual wood structures at the 1959 Oregon Centennial Exposition and Trade Fair (below) is the Forest Products Pavilion which utilized seven hyperbolic parabolas. Architect is John Storrs, and Consulting Engineer is James G. Pierson.

Wood—nature's age-old building material—may receive significant man-made improvements, if a series of recently announced research programs prove successful.

A score of recommendations for such improvements were made at the recently-held two-day *Wood Industry Product Planning Conference* in Washington, D.C. Among the participants were leading architects and builders who felt that the next decade would see an increase in the use of wood in home construction if a large measure of these recommendations were adopted.

Most of the proposals call for lumber manufacturers to expand and accelerate their research in an effort to:

1. *Improve present methods of component construction.*
2. *Hold down or reduce the on-site labor costs of builders.*
3. *Make available more pre-cut, prepackaged and pre-finished wood items.*
4. *Help builders to conserve materials through more precise engineering and use of the same materials for both structural and finish purposes.*

Attended by 27 nationally-known figures in the fields of building, home design, lumber manufacture and lumber distribution, the Wood Industry Product Planning Conference was sponsored by the National Lumber Manufacturers Association, the Timber Engineering Company, NLMA's research-engineering affiliate, and the National Association of Home Builders.

The conference was called by lumbermen to get the views of architects and builders on how wood might "capture" a greater share of the housing market. In this connection, builders, architects and others familiar with the use of wood in home construction were asked for constructive criticism of the lumber industry and its present products.

A/E NEWS presents below a "run-down" on the proceedings of this conference and news of the work of other research and engineering groups in this industry.

The concensus among architects and builders was that wood has a "tremendous future" in home building if the lumber industry will undertake the product research necessary to keep pace with competitive materials.

Characteristics and objectives

Through the NAHB Research Institute, the homebuilders have the objective of increasing the size and improving the quality of houses, while reducing their cost through technical advancement. In this endeavor, they seek the cooperation of manufacturers, working with any or all on an equal basis.

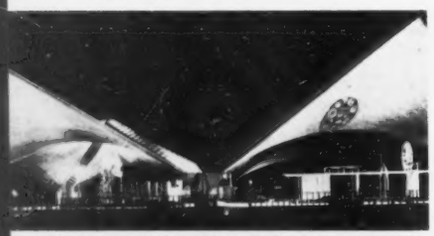
Their efforts are directed toward the "mass markets" within the price ranges attainable by the greatest number of American families. By reducing the cost of the structure itself, they aim to provide more convenience and comfort items within the home. In seeking to reduce cost, they look for means to reduce on-site labor and construction time, requiring materials and products adaptable to rapid assembly and combining functions of structure, insulation, and finished surfaces. They look upon traditional methods of materials handling and framing as wasteful of time and materials.

Any cost saving from $5 a house upwards is important to the volume builders. A major problem is educating the subcontractors and small builders to cost-saving innovations.

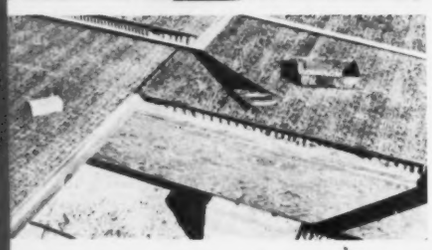
In design, architects and builders concerned with this area of housing, expressed more interest in an integration of design and engineering of the house. Architectural services will be used more in the future, with emphasis upon a combination of livability in plan and exterior, and engineering for cost-saving construction. "Style" will gradually change to modern concepts in pace with the contemporary design.

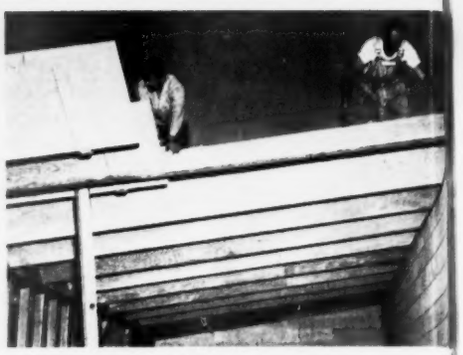
The builders see the manufacturers as having a responsible part in the design process. For the wood industry, this means research to improve wood framing and the design of new products as an integral part of house design.

The homebuilders assert that they are the customers for the materials manufacturers, since, in the *process of building houses for sale*, they make the decisions on the materials and products to be used. Their decisions are based on continuous studies of consumer acceptance in the purchase of finished homes. New materials should not attempt to copy old ones, but must appeal to the home owner as having quality and appearance suitable to residential design. Product development with this in mind can benefit all stages of the process from consultation with the homebuilding industry.

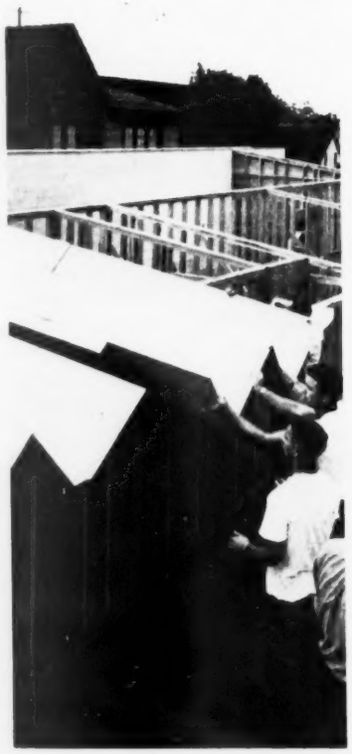


Fir plywood sheathing (below) supported by plywood box beams at warehouse in Richmond, Ill. Instead of blocking, clips were used to stiffen panel edges. Honeycomb floor panels (bottom photo) have ¼" embossed fir plywood top skins with conventional ¼" exterior type fir plywood bottom skins in Hayes Residence, Sarasota, Fla. Architect: Paul Rudolph, AIA.





No frame of any kind (above) required to install and join 16-foot "W" components, through a lumber "T" used to move them into place. First of 2 tiers (below) of "Ws" being installed at Seattle. Each component lag-screwed on supporting wall plates and then nailed to adjacent component along peak chord. Later, second tier components spliced to those of first.



Floor and foundation systems

About 16 per cent of today's houses are built on concrete slabs. Whether this will increase is debatable, though the volume builders at this conference stated their preference for basementless construction for their building operations and their attempt to give the home owner more space above grade.

Home owners do like wood floors and the builders stated their interest in any wood floor system that is time-saving and competitive with slab construction. Suggestions for the following were made:

1. *A treated wood floor system in direct contact with the ground.*
2. *Panelized floor systems on a simplified pier and beam supporting system. The cantilever principle can develop maximum utilization of material strength.*
3. *Floor construction combining the subfloor and finished floor.*
4. *Finished wood flooring that can be applied rapidly to either slab or subflooring as, for example, flooring in rolls attached to paper or canvas.*
5. *Floor components including insulation and heat ducts.*
6. *For houses with a floor over a habitable space (like a recreation room) floor panels should have a prefinished floor on the top surface, a ceiling finish on the lower surface.*
7. *The engineering of supporting beams needs inquiry into the limits of present allowable stresses which seem unrealistically low.*
8. *Board subflooring can be improved by fabricating large units of boards combined with paper overlays.*
9. *Particle board seems to have possibilities for structural units combined with subflooring.*
10. *Wood waste (sawdust) might be used as extender for plastics in panel cores.*

Exterior wall systems

The utilization of panelized or component construction versus conventional construction was also a subject of debate among the participants of this conference. The latter method still offers a cost advantage for the large volume homebuilder like Levitt, but components manufactured or assembled off the site are regarded as having the greatest potential for the average builder. The prefab industry is producing more panel components and many builders have adapted their operations to panel or tilt-up systems of various kinds.

The latest NAHB research houses used panelization: one with components of framing lumber and tempered hardboard, and the other with sandwich panels of various skins on a polystyrene foam core.

The group feels that the lumber industry can do much of immediate value by simple improvements in engineering design of conventional framing, standardization of stud heights, header details, and by the elimination of useless on-the-job cutting and the coincident waste of materials. Dr. A. G. H. Dietz, Professor of Building Engineering at the Massachusetts Institute of Technology pointed out that the wood frame and skin have much more strength than is being utilized structurally.

A discussion of fasteners for wood framing systems lead to a conclusion that better and more efficient methods than nailing can be found, thereby contributing to accurate spacing of framing members.

Agreement was reached that the potential of research in component construction is unlimited. *(Throughout this article, one will find illustrations of various component developments for wood.)* Objectives for this type of product development must include structural strength, insulation, prefinished surfaces, in order to produce the end result of precision-made components of a size suitable to flexible planning. In contrast to the unit component, a suggestion was made that wall material should be produced in long lengths, be adaptable to cutting to required size, and that window openings be cut in at optional locations.

At this panel discussion, the chemical industry was cited as presenting a great challenge to the wood industry for wall construction by its concentration on frameless sandwich panels.

Windows and exterior siding

An opinion was expressed that much of the market for windows has been lost to non-ferrous metals. Wood windows were criticized for "old fashioned" design details with too many parts. Newly developed designs must be adapted to application on the outside of holes cut into a prefabricated wall, or engineered as structural window panels to be used in conjunction with solid panelized wall components. New glazing compounds and methods were recommended. Another expressed need was that attention should be given to the framing of fixed-glass window walls with structural lumber. The industry was urged to standardize a very limited number of window sizes to be offered at a real cost advantage.

In the matter of exterior siding, the non-ferrous metal industry is considered as making significant inroads upon the wood siding market, by its stressing the value of low maintenance. In gable-end design, the non-ferrous metal people have designed siding to perform the multiple function of wall surface and gable ventilator. The wood industry was urged to develop siding to go up faster in larger sections with improvement in the methods of attachment. The siding should perform both the function of siding and sheathing. It should also be prefinished to the point of priming. Panelization of walls presents new problems for the siding industry which are capable of solution through extended research. Long wall panels are considered adaptable to horizontal siding, but the horizontal effect is difficult with 4 foot panels because of the jointing problem, unless a method is presented in which the siding is applied after erection of the frame.

Roof and ceiling systems

Conferees felt that both attic-type and non-attic type systems will continue in use. For the attic-type construction, trusses will be used more and more for speed of construction and flexibility in the house plan. Monoplane trusses are favored for economy in shipping space, but no absolute agreement on the best method of fabrication such as glue-nailing, plates, gang nailing, etc., was reached. Also some connector products were considered of dubious quality.

A discussion of proper stress-graded lumber for trusses resulted in a suggestion for pre-cut, prepackaged truss material, for trusses of standard sizes, certified and grade-marked for load-carrying capacity and grade of lumber.

A stated objective in roof construction was for a weather-surfaced sheet material that will span across trusses of rafters without the problem of blocking joints.

When an attic-less construction is used, in which the underside of the roof forms the exposed ceiling, the roof component must include insulation value, and an attractive ceiling finish, preferably with acoustical quality. For ceilings under attics, a recommendation was made for a large acoustical panel, at least 4′ × 4′, to replace present small size acoustical tiles.

The wood industry seems to have at its command, in various forms of wood products, all the materials for roofing panels plus the "know-how" for engineering better systems of support. Competitive products are aiming at the production of sandwich panels to provide a "frameless" roof structure, except for a very minimum of supporting beams.

A number of suggestions were made for larger components of wood, using low-grade wood for panel cores or inner plies of laminates.

Interior applications

The interior of the house needs more research attention than it has received heretofore, because the finishing of a house requires more time and money than building the exterior shell. Interior partitions are not as adaptable to modular panels as exterior walls because of the infinite variety of door locations and other dimensional variations encountered in making partitions fit. Another problem in modularization is the integration of wiring and duct work.

(Please turn page)

Prefabricated stressed-skin plywood panels used to cover walkways connecting buildings of Puyallup, Washington school. The 4½" thick panels of medium-density overlaid fir plywood sheets glued to 2"x4" framing members and rest on steel framing 16' oc. Strength of panels, which can span distances up to 20', makes conventional framing unnecessary.

Another interesting wood structures at Oregon Exhibition is an inter-denominational chapel in the "International Garden of Tomorrow."

Commercial building (above) dominated by vaulted roof over glassed-in display area. Architects: Swedberg and Anderson. Stressed skin fir plywood panels (below) provide both roof decking and ceiling on Seattle residence. Similar panels form second story floor and ceiling of first. The 12'x4' panels glued to lumber framing members. Construction costs about $8.20/sf.

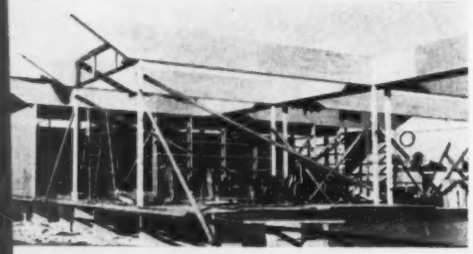
WOOD

present & future

(Continued from page 7)

Fir plywood sandwich panels provide 12,000 sq. ft. of sheltered area at South Tacoma swimming pool (above and below). Fir plywood top and bottom skins are glued to lumber framing. Panels have tongue-and-groove joints, and are supported by laminated beams.

Huge fir plywood box beams, (above) supported on box-beam columns, provide structural frame work of this 76'x160' lumber shelter at Houston, Texas. Beams are 76' long, and columns are 18" high. Both beams and columns have ¾" exterior plywood webs, nailed and glued to lumber flanges. Wood box beams (below) at this Sarasota, Fla. residence support both roof and floor. Strength of honeycomb core permits webs of ¼" fir plywood. Architect: Paul Rudolph, AIA.



Builders expressed the need for a partition that would have both structure and finish and that could be trimmed to the desired length on the job. The question of providing a variety of interior finishes posed another problem which would suggest a structural core to which optional finishes can be applied with adhesives in assembly shop or on the job.

Particle board material was proposed for the manufacture of such partitions. Trim was considered desirable in room-length sizes for conventional applications, but should be so designed as to become part of the prefinished panels.

Acoustical problems were recognized as affecting partition design. A suggestion was given for large size acoustic panels for ceilings as well as walls.

In brief, with boards and plywood, the wood industry has material for attractive prefinished interior walls, and particle board for painted surfaces.

The conference had little to say about doors except for criticism of wood doors for warpage. The builders believe a major breakthrough in door design was made in the NAHB South Bend research house where full wall height doors were hung on the *outside* of the opening. This method of door application was stated to eliminate the door panel as a problem in research on interior partitions.

Kitchen cabinets were referred to briefly, chiefly with a warning that wood cabinets may lose recently regained popularity if inferior products reach the market. It was believed that a way is still open to produce cabinet work on the principle of those in the Kensington research house which eliminate the principle of an assembly of boxes.

Glued-laminated and special forms

A discussion of post and beam construction and the use of glued-laminated beams, bents, and arches developed into a discussion of design with wood to achieve houses which are truly "wood houses."

Architect Victor A. Lundy, AIA of Sarasota, Florida, described his design for a house in which laminated wood arches were utilized which freed the plan of the usual structural limitations. Architects and builders at the conference agreed that his design pointed the way to new concepts in design and engineering for residential work which would offer greater possibilities for the use of wood in both structure and prefinished, non-load bearing panels.

Another possibility offered was the adaptation of standard glued-laminated shapes now used primarily in agricultural or industrial buildings.

Architects Paul H. Kirk, FAIA of Seattle, and Herman H. York, AIA of Jamaica, New York, debated the problems of achieving quality and livability with wood as a material in low-cost houses where it must compete with cheaper or less expensive materials. The challege for the wood industry in the sponsorship of architectural design lies in the ability to employ wood products and materials in ways that would fully exploit the inherent beauty and quality at lowest cost. This should be a major effort in the Wood Promotion Program of the lumbermen, according to architects Kirk and York. The full utilization of wood in house design may be realized first in higher priced houses, thereby pointing the manner of future adaptations for the lower cost mass markets.

Wood materials and products

On the problems of engineering data for wood construction: Throughout the conference, references were made to penalties on the use of wood because of allowable stresses and other design criteria. Changes in the new FHA *Minimum Property Standards* are an example. The participants believed that any lowering of the design properties of wood would open the way still further for competitive products would win markets away from wood.

An observation by industry participants questioned why the wood industry relied upon government laboratories to set its criteria whereas other major materials industries developed their own technical data which is accepted as authoratative by the FHA and code bodies.

A strong recommendation was made for a central, industry-sponsored wood laboratory to develop criteria for the industry and to publicize all new developments to architects and builders with well-prepared technical information.

Problems of standardization of sizes, precutting and packaging: In view of practical developments in this area of immediate value, the participants discussed the problems of wasted time in materials handling, and time and materials cost of cutting non-standard lumber sizes. Ceiling heights have been virtually standardized at 7'-6" or less than the 8'-0" stud. Large-scale house building operations represent orders of lumber large enough to warrant precutting to standard lengths and prepackaging of material for a job.

Efforts in this direction will require close liaison between the lumber industry and major homebuilders to agree upon standard sizes and prepackaging methods.

The recommendation is made here (also mentioned under Roof and Ceiling systems) for prepackaged, standardized trusses.

Builders regard all finishing operations of wood products as expensive and time-consuming and they seek prefinished products. There is some debate on the amount of prefinishing that is practical, especially on the exterior, with fair agreement on pre-priming as a desirable start. Interior components might be completely finished, except for the problem of optional colors and finishes desired by the home owners.

Agreement was expressed that material suppliers will have to be educated to proper treatment of prefinished materials. Prefinishing is most likely to pay when homebuilding reaches the point of being primarily an assembly of manufactured components.

A wood industry man reminded the conference that near-permanent finishes for wood are available in the field of treating chemicals and stains.

Edge and end gluing, fasteners and particle board: Generally architects and builders present felt that edge and end gluing and particle board material would produce new products that would perform functions in the structure better than lumber in its traditional form. The lumber industry researchers recognize present limitations (considered primarily economic) on new products of these kinds but they are spending research money on these problems.

The principal idea in fasteners was the production of adhesives or metal fasteners that will be superior to old nailing techniques. Architect Paul H. Kirk, FAIA asked for a super "tinker-toy" system not requiring hard-to-find craftsmen for a good, fast assembly job.

Research and new products

Lumber industry participants outlined the nature of research in the industry from forestry practices and mill operations to product development. Some of this research is long-term, geared to the time cycles of management of tree growth; other projects are aimed at immediate results.

Research was reported on a variety of products, including extra-long laminated panels; roof deck panels; large-size end- and edge-glued material; large siding panels with hardboard faces; 2′ × 8′ sheathing material with paper overlays; particle board products and adhesives; combinations of wood with plastics and paper. The industry is reported to be at work in simplifying the grading structure.

Product development in the lumber industry is carried generally by the larger companies. Basic research is done by the Forest Products Laboratory and a number of state and educational institutions.

It was agreed that the keenest competition in research for new products would be with metals and plastics. The wood industry as a whole is seeking to attain the research attitude of its competitors and has indicated its willingness to invest in research.

Architect Kirk urged the lumber industry to spend $1 million a year to operate its own research and development

center, and through this center, become the source of authoritative technical information on wood products for the homebuilding industry, as well as the authority on technical criteria for wood as a building material.

Summary

A summary was made of the two-day conference in which the lumber industry was advised to learn more about the homebuilding industry and its objectives and to shape its research programs toward these objectives in terms of engineering new wood construction systems and developing new products. A goal of $5 per square foot for the cost of the house structure was set to reach millions of American families.

The architects participating in the meeting called for greater emphasis on good design and special features that would increase livability and individuality of home. These factors, the architects contended, should be given as much consideration as building costs.

A summary of the major recommendations of the conference called for early development of:

1. A standard wall framing system faster and more economical than conventional wood framing.
2. Structural wall panels which are insulated and finished on both sides.
3. A pre-framed structural wall system produced in standard heights and adaptable to easy alteration on the job site.
4. Improved methods for using structural lumber for finished openings, thus eliminating frames and trim.
5. Standard designs and parts for load-bearing window walls.
6. Wood windows with fewer parts and a simple method for incorporating windows in sandwich walls.
7. A roofing panel complete with interior and exterior finish and insulation, to cover spans of four feet or more.
8. Laminated materials stronger than plywood, with economy lumber as cores and finished lumber for facing.
9. New structural and finish uses for wood particle board.
10. New acoustical applications of large wood panels.
11. A more economical system of wood floor construction for installation over crawl spaces, basements and first floors.
12. A new product combining both subfloor and finished flooring.
13. A combination floor-ceiling panel for one-piece construction of ceiling and subfloor between two habitable levels.
14. Assembly line methods to adapt custom designs and engineering to the mass housing market.
15. Pre-cutting and pre-packaging of studs in less than eight-foot lengths.

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FOLDED PLATE DESIGN

A tentative design method of plywood folded plate roofs has been developed by engineers of the Douglas Fir Plywood Association. The association states that this information is intended as a guide to the design of such roofs and the method represents a theoretical approach—not to be used indiscriminately. Recommendation is made by the DFPA that verification by full-scale load tests be made before it is established as a "design-method."

Basis of design approach

The folded plate roof is the simplest form of shell structure. The idea is not new, as reinforced concrete "corrugated" roofs have been built for many years. And, on a smaller scale, corrugated metal obtains its strength in this manner. Since wood formwork is required for concrete, it may seem strange that wood folded plate roofs have not been constructed until recently. However, it was not until the Douglas Fir Plywood Assn. developed engineering data on plywood roof diaphragms that the high shear strength and rigidity of plywood could be utilized in this manner. This reserve strength is not employed if conventional framing is used.

A plywood folded plate roof differs from conventional pitched roof construction in that the roof sheathing and framing are designed to act together as a giant inverted V-shaped beam to span from end-to-end of the building. A multiple-bay roof is made up of several such "beams" connected together side by side.

Basically a folded plate consists of two inclined planes aefd and ebcf (*Figure 1*). Members spanning from eave to ridge are employed to transfer vertical loads acting on the planes to points of action along lines ad, ef, and bc. Beams or walls provide vertical support for, and prevent excessive vertical deflection of, lines ad and bc. However, along ef, vertical support is provided by each plane supporting the other. This exerts a thrust (S) in the tilted planes of the roof which is carried in shear by plywood diaphragm action to the ends of the building and thence to the four corners. Vertical supports and some means of resisting the accumulated horizontal thrust are necessary at points a, b, c, and d.

Deflection parallel to the roof plane is resisted by the beam action of the plane. Ridge and eave chords similar to beam flanges are provided to carry the compression and tension at the edges of the planes. The plywood "web" is assumed to carry only shear. (*Figure 2.*)

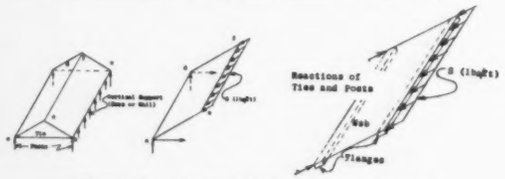

Figure 1. (left) Folded plate action and Figure 2. (right) Beam action of roof plane.

The analysis of a multiple-bay folded plate differs slightly in that at the interior valleys, support is again provided by each plane supporting the other so that no walls or vertical beams are required if the valley chords are adequately connected. This doubles the shear wichh must be resisted by the interior plates and chord stresses are greater.

Advantages

The following advantages are offered by folded plate design as opposed to other methods of roof construction.

1. *Clear, uncluttered interiors result as trusses or other members which span from valley to valley are eliminated.*
2. *Since the plywood sheathing is utilized as part of the "structural unit," long spans are possible with small framing members. A plywood ceiling may also be used as finish, and to carry additional shear.*
3. *Generally, assembly is with nails only — no gluing is required, although it may be added simply to improve rigidity.*
4. *Either conventional site construction or shop prefabrication is practical. Stressed-skin panels may be used as components of the folded plate, or one or more entire plates may be prefabricated.*
5. *Interesting form and economy are combined for buildings ranging in size from residences to large industrial structures.*

Disadvantages

1. *On multiple-bay structures, drainage needs special attention.*
2. *Since shear in the roof diaphragm diminishes with increase in slope, more area of roofing is required for a well-designed folded plate.*
3. *Folded plates do not readily lend themselves to incorporation of a flat ceiling.*

Derivation of stresses in a single-bay folded plate for uniform vertical loading

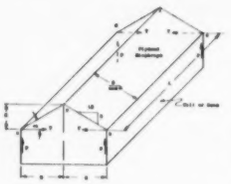

Figure 3: Single-bay folded plate.

L = Length of building (ft)
2B = Width of building (ft)
R = Rise of roof in 12
α = Inclination of roof; $\cot \alpha = \frac{B}{H}$
T = Horizontal thrust (lbs)
w = Uniform load on horizontal projection of roof (lbs/sq ft)
H = Total rise in roof (ft)
P = Compression force in posts (lbs)

Bending moment normal to roof planes

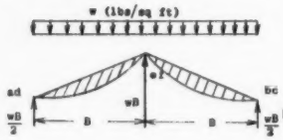

Figure 4: Rafter loading.

For this purpose, assume the support provided by the plates at *ef* is a reaction. The two plates act as simple beams:

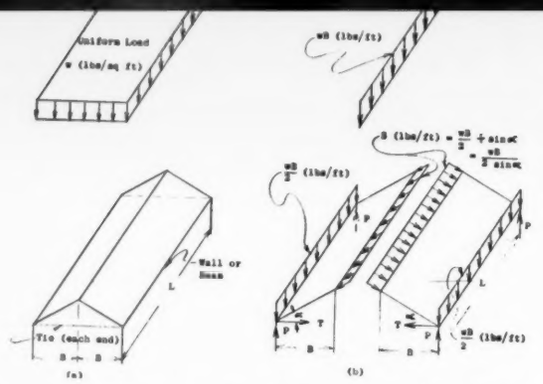

Figure 5: Forces acting on symmetrically loaded roof plane.

Therefore M_{max} (ft-lbs) $= \frac{wB^2}{8}$

This moment must be resisted by rafters, and because these can be designed by conventional engineering formulas, rafters will not be considered further.

In *Figure 5*, the portion of the uniform load which must be carried by a beam or a wall is $\frac{wB}{2}$. That portion which is carried to the columns by diaphram action of the plywood is wB. This has been resolved into two equal components S, one acting in the plane of each plate. Since the forces carried by the beam or the wall are independent of the "folded plate" action, they are not considered further in the single-bay design development.

Shear

The maximum diaphragm shear V_{max}, at the gable ends of the building can be obtained by isolating one of the plates and drawing the shear diagram.

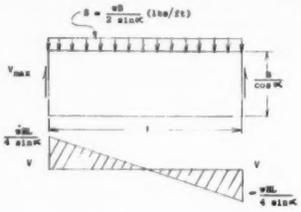

Figure 6: Shear diagram.

For the given *figure 6:* V_{max} (lbs) $= \frac{wBL}{4 \sin \alpha}$

The shear per foot of diaphragm width v_{max}, at the ends of the building is:

$$v_{max} \text{ (lbs/ft)} = \frac{wBL}{4 \sin \alpha} \div \frac{B}{\cos \alpha} = \frac{WL \cot \alpha}{4} = \frac{wBL}{4H}$$

From the above shear equation it is evident that the shear in the roof diaphragm diminishes as the slope (H/B) of the roof increases, and the length of the roof (L) decreases. It is independent of the distance between valleys (2B).

Nailing

n_1 = nail spacing at ridge ends
n_2 = spacing on ridge at L/2
n_3 = nail spacing at gable ends and eave chord ends
n_4 = interior panel edge spacing

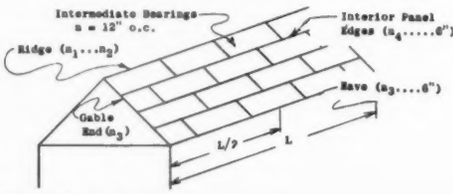

Figure 7: Nailing conditions.

Plywood sheathing-to-rafter connections must resist the shear v, at all points. For any diaphragm, the nail spacing in inches is calculated by dividing the allowable bearing load per nail, multiplied by twelve, by the applied shear in pounds per foot.

Folded plates have an additional force $S = \frac{wB}{2 \sin \alpha}$, on the ridge joint. This force is usually resisted by the plywood-to-ridge nailed connection, although the ridge-to-rafter joint could be designed to carry it. When the former is the case, the maximum force on the plywood-to-ridge joint is the resultant of the horizontal shear force $v = \frac{wBL}{4H}$, and the ridge force $S = \frac{wB}{2 \sin \alpha}$. Thus the ridge nail spacing at the ends of the diaphragm is:

$$n_1 \text{ (inches)} = \frac{\text{allowable bearing load per nail} \times 12''}{\sqrt{\left(\frac{wBL}{4H}\right)^2 + \left(\frac{wB}{2 \sin \alpha}\right)^2}}$$

The shear force decreases to zero at midspan, so that the ridge nailing is only required to develop the force, $\frac{wB}{2 \sin \alpha}$.

$$\textit{Therefore} \qquad n_2 = \frac{\text{bearing load} \times 12''}{\frac{wB}{2 \sin \alpha}}$$

The nailing at the roof ends, along the bottom chord, and at interior panel edges must resist only the horizontal shear, $\frac{wBL}{4H}$

$$\textit{Therefore} \qquad n_3 = \frac{\text{bearing load} \times 12''}{\frac{wBL}{4H}}$$

Extensive diaphragm tests conducted in the Douglas Fir Plywood Assn. laboratory and elsewhere, fortified by experience, have shown that the nail spacing should not be greater than 6″ o.c. at panel edges and 12″ o.c. at intermediate bearings. However, the tests indicated that at interior panel edges, the calculated spacing can be increased 50 per cent if the panel edges are staggered perpendicular to the ridge as shown in *Figure 7*, and if there are at least three courses of plywood. (No increase at boundaries . . . i.e., ridges, eaves, gable ends.) This (n_4) can be increased uniformly to 6″ o.c. at midspan, and the intermediate nailing at all bearings can be spaced 12″ o.c.

To avoid splitting rafters and blocking when the calculated spacing is closer than about 2″, it is suggested that 4″ nominal dimension lumber be used so that nails can be staggered in two lines.

Horizontal thrust at roof ends

The horizontal thrust (T) at the ends of the roof and the force (P) in the corner posts are those required for equilibrium with the shear in the plywood (ignoring the component delivered to the columns from the eave beams).

$$T \text{ (lbs)} = V_{max} \cos \alpha = \frac{wBL \cot \alpha}{4} = \frac{wB^2L}{4H}$$

Compression force in corner post

$$P \text{ (lbs)} = V_{max} \sin \alpha = \frac{wBL}{4}$$

If an eave beam is used in place of a wall, the reaction of the beam on the post would be added to the above force to get the total load on the post.

Chord stresses

Each diaphragm acts as a deep girder in resisting forces acting in its plane and normal to the ridge. These forces $S = \frac{wB}{2 \sin \alpha}$, are the same as determined above for shear. The chords are assumed to carry the entire bending stresses.

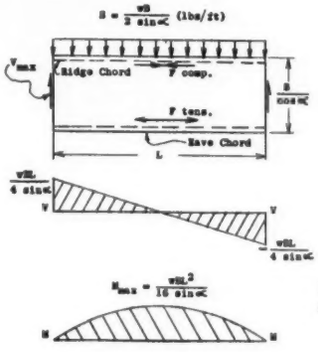

Figure 8: Shear and moment diagrams.

Shear and moment information

From the given *Figure 8:*

$$\text{Applied} \quad M_{max} = \frac{wBL^2}{16 \sin \alpha}$$

$$\text{Resisting} \quad M_{max} = \frac{FB}{\cos \alpha}$$

Therefore F (lbs) in tension chord

$$= \frac{wL^2 \cos \alpha}{16 \sin \alpha} = \frac{wL^2 \cot \alpha}{16} = \frac{wBL^2}{16H} \text{ [Eave Chord]}$$

And F (lbs) in compression chord, two sides loaded

$$= 2\left(\frac{wL^2 \cot \alpha}{16}\right) = \frac{wBL^2}{8H} \text{ [Ridge Chord]}$$

Deflection

d = vertical deflection of ridge
h = horizontal deflection of eave

$$h = d \tan \alpha = \frac{dH}{B}$$

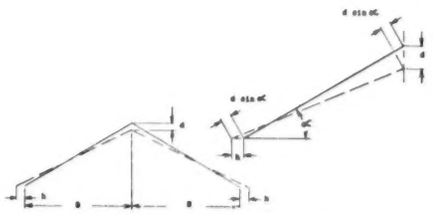

Figure 9: Deflection of diaphragms.

In a folded plate roof, the eaves are free to move outward, but not downward when a wall is present. They move out a distance h, sufficient to allow the elastic deflection of the loaded diaphragm, d sin α, to take place. This deflection is caused by the load $S = \frac{wB}{2 \sin \alpha}$ acting on the edge of the diaphragm parallel to its surface. The horizontal distance h, is equal to d tan α, where d is the vertical deflection of the ridge. The value of d is not doubled for the deflection of the other side of the roof.

If the eave rafters are supported on a beam, its deflection will add to that of the ridge.

Deflection, d sin α, can be computed from information in *Basic Facts about Fir Plywood Diaphragms* or *Technical Data on Plywood*, Section 11, both published by Douglas Fir Plywood Assn., using the shears, plywood thicknesses, etc., calculated as shown in the *Derivation*.

The deflection normal to the plane of the diaphragms of the individual rafters can be calculated by the usual engineering formulae.

Derivation of stresses in a single-bay folded plate for unsymmetrical vertical loading

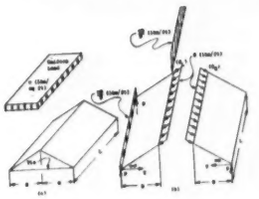

Figure 10: Forces action unsymmetrically loaded roof planes.

Unsymmetrical loading caused by material and equipment during construction, drifting snow, etc., produces maximum stresses in some types of structures such as arches. However, uniform loading on the half span causes forces in the folded plate roof which are equal to only half those forces due to symmetrical loading. The proof of this statement follows for a single bay roof:

As for symmetrically loaded roofs, the left wall reaction of *Figure 10b* is simply the vertical reaction $\frac{wB}{2}$ of the rafters spanning as simple beams between ridge and eave. The right wall reaction, with no vertical load on the right plate, is equal to zero. Since the sum of the horizontal forces must be zero for equilibrium and since the slopes of the two roof halves are equal,

$$S_L \text{ (lbs/ft)} = S_R = \frac{wB}{4} \div \sin \alpha = \frac{wB}{4 \sin \alpha}$$

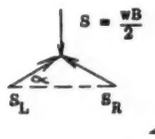

Figure 10B: force diagram.

Therefore, this force is one half of the force in a similar roof symmetrically loaded. It follows that the maximum shear stresses, chord forces, tie forces, deflection, etc., are also one-half of those for a symmetrically loaded folded plate roof.

Derivation of stresses in a multiple-bay folded plate for uniform vertical loading

A method of analysis similar to that for single-bay folded plates is used for those of more than one bay.

True multiple-bay folded plate roofs require no beams or walls at the interior valleys. If such supports are present, the sections may be designed as a series of single-bay folded plates. In a true multiple-bay roof, the two *outer* plates are designed as single-bay folded plates; and beams or walls are required, since there are no adjacent plates to provide support. Interior plates, because they support adjacent plates, carry twice as much vertical load as outer plates.

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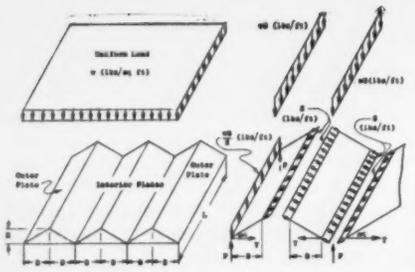

Figure 11: Forces acting on multiple-bay folded plate.

Given *Figure 11* above illustrates the external forces acting on a multiple-bay folded plate roof.

In *Figure 11* as in *Figure 5*, that portion of the vertical load which must be carried by a beam or wall to the columns is designated $\frac{wB}{2}$. The loads wB, acting at the ridges and interior valleys, which are carried by the diaphragm action of the plywood, have been resolved into two components S, each acting in the plane of the plates.

$$S\ (\text{lbs/ft}) = \frac{wB}{2 \sin \alpha}$$

The outer plates and eave chords are designed as detailed in "Single-Bay, Uniform Vertical Loading."

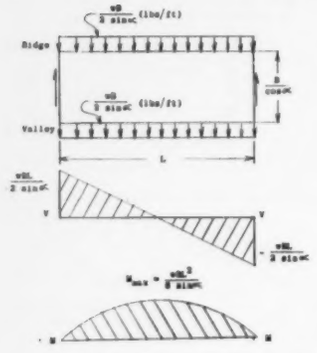

Figure 12: Shear and moment diagram for interior plates.

Shear (interior plates)

From *Figure 12*;

$$V_{max}\ (\text{lbs}) = \frac{wBL}{2 \sin \alpha}$$

The shear per foot of diaphragm width at the ends of the plates is:

$$v_{max}\ (\text{lbs/ft}) = \frac{wBL}{2 \sin \alpha} \div \frac{B}{\cos \alpha} = \frac{wBL}{2H}$$

Nailing conditions

n_1 = nail spacing at ends of interior ridge and valley chords
n_2 = spacing at L/2 for interior ridge and valley chords
n_3 = nailing at gable ends
n_4 = panel edge spacing at ends

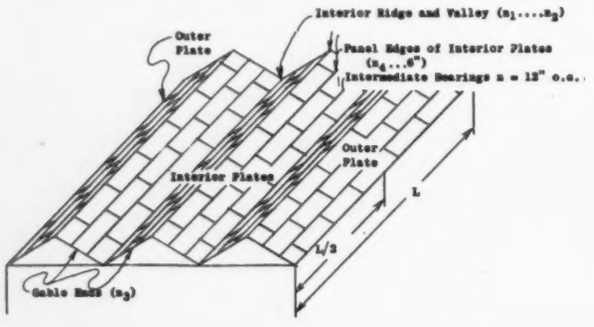

Figure 13: Nailing conditions.

For the most part, nailing of multiple-bay folded plates is designed in the same manner as for single-bay roofs. The nailing for the outer plates is designed using the shear values for single-bay folded plate roofs. However, the force in the plane of the diaphragm, $S = \frac{wB}{2 \sin \alpha}$ occurs on both the ridge and valley joints. Again, this may be resisted by the plywood-to-chord connection or the chord-to-rafter joint. For the former condition, the plywood-to-ridge chord and plywood-to-valley chord joints must be designed for the resultant of the horizontal shear force, $v = \frac{wBL}{2H_4}$, and the force $S = \frac{wB}{2 \sin \alpha}$. Thus the interior ridge and valley nail spacing at the diaphragm ends is:

$$n_1\ (\text{inches}) = \frac{\text{allowable bearing load per nail} \times 12''}{\sqrt{\left(\frac{wBL}{2H}\right)^2 + \left(\frac{wB}{2 \sin \alpha}\right)^2}}$$

The spacing at L/2 where the shear is zero is:

$$n_2 = \frac{\text{bearing load} \times 12''}{\frac{wB}{2 \sin \alpha}}$$

The nailing at the roof ends and at panel edges (other than boundaries) must resist only the horizontal shear, $\frac{wBL}{2H}$

$$n_3 = \frac{\text{bearing load} \times 12''}{\frac{wBL}{2H}}$$

Again, except at boundaries the calculated spacing can be increased 50— if the panel edges are staggered perpendicular to the ridge and if there are at least three courses of plywood. This spacing can be increased to 6" o.c. at midspan and the intermediate nailing at all bearings can be spaced 12" o.c.

Horizontal thrust at roof ends

Since the thrusts of opposing interior plates balance each other, if horizontal ties are used, the force in them is only that due to the outer plates and is:

$$T\ (\text{lbs}) = \frac{wB^2L}{4H}\ (T)$$

In order to resist this thrust, ties are required in the inner, as well as the outer, bays. However, if the thrust is taken out by shear walls in the outer bays, ties are not necessary in the inner bays, unless required by unsymmetrical loading.

Compression force in corner post

The forces (P) in posts are equal to the vertical components of the V_{max} forces at the post. Thus, post forces can be computed by adding up the individual V_{max} forces at a given post and multiplying by the sine of the angle of roof inclination.

$$P\ (\text{lbs}) = \Sigma\ V_{max} \sin \alpha\ (P)$$

Chord stresses

The interior valley and ridge (tension and compression, respectively) chord forces are:

$$F\ (\text{lbs}) = \frac{wBL^2}{4H}\ [\text{Valley \& Ridge Chords}]$$

The stress in an outer ridge chord is that due to an outer plate and an interior plate and is:

$$F\ (\text{lbs}) = \frac{3wBL^2}{16H}\ [\text{Outer Ridge Chord}]$$

The ridge and valley chords must be continuous for the length L, of the folded plate. In addition to being designed for tension parallel to the grain, the valley chords must be designed to resist a splitting force normal to the grain. This can be visualized by imagining a supporting wall at the valley such as might be utilized in conventional construction. If this wall is then removed, it follows that each plate must be exerting a lifting or tension force on the other plate in order to maintain equilibrium. The tension forces exerted by the plates act perpendicular to the valley chords and the chords must be designed to resist them. The force is assumed to be applied parallel to the sheathing and is $S = \frac{wB}{2 \sin \alpha}$.

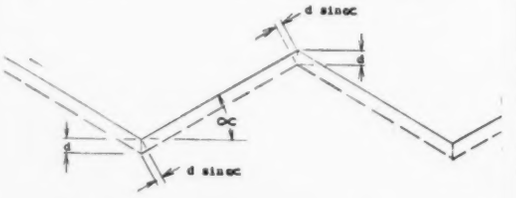

Figure 14: Deflection in a multiple-bay roof.

Deflection

Deflection is computed in the same manner as in a single-bay roof except that movement at the valleys in interior plates is confined to the vertical rather than the horizontal plane, when the plates are equally loaded.

The deflection d sin α of the interior plate is due to the load, $S = \frac{wB}{\sin \alpha}$, acting in the plane of the plate, and may be computed as shown earlier in this discussion.

Design example of a Multiple-Bay folded plate

Rafters: 4" x 10" x 22'–0" @ 48" o.c.
Blocking: 4 x 4's under panel edges
L = 64' (spacing between horizontal ties)
2B = 40', B = 20'
R = 6 in 12
α = 26°34', sin α = 0.447, cos α = 0.894
w = 12 lbs/sq ft LL + 10 lbs/sq ft DL = 22 lbs/sq ft (on horizontal projection)
H = 10'

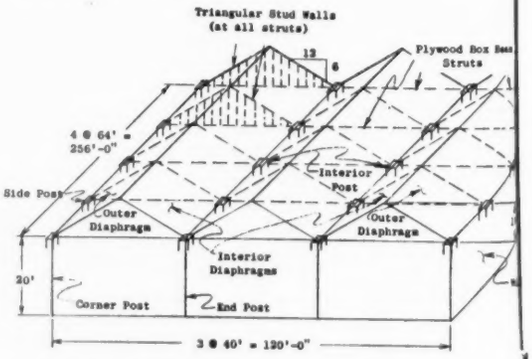

Figure 15. Five-fold roof for large building.

Sheathing Thickness

Outer plates $v_{max} = \frac{wBL}{4H} = \frac{(22)\ (20)\ (64)}{4(10)} = 704$ lbs/ft

Interior plates $v_{max} = \frac{wBL}{2H} = 1408$ lbs/ft

Maximum plywood shear stress $= \frac{1408}{12(0.75)} = 157$ psi < 180 psi

Therefore, 3/4" section is adequate on supports spaced 48" o.c.

Nailing

Use 10d common nails with an allowable lateral bearing load of 120 lbs/nail. Design the plywood to-chord joints to resist the vertical force S, in addition to the horizontal shear.

The nail spacing at the ends of the interior ridge and valley chords is:

$$n_1 = \frac{\text{bearing load per nail} \times 12}{\sqrt{\left(\frac{wEL}{2H}\right)^2 + \left(\frac{wB}{2 \sin \alpha}\right)^2}}$$

$$= \frac{120(12)}{\sqrt{(1408)^2 + (490)^2}} = 1''$$

and at L/2, the spacing is:

$$n_2 = \frac{\text{bearing load} \times 12}{\frac{wB}{2 \sin \alpha}} = \frac{120(12)}{490} = 3''$$

The nail spacing at the interior gable ends is:

$$n_3 = \frac{\text{bearing load} \times 12}{\frac{wBL}{2H}} = \frac{120(12)}{1408} = 1''$$

The panel edge nailing except at boundaries (ridge, valley, gable ends) is:

$$n_4 = 1.5n_3 = 1\tfrac{1}{2}''$$

and this may be increased to 6″ o.c. as shear permits. All other interior bearings should have nails spaced 12″ o.c. The nailing for the outer plates should be designed as for single-bay folded plates.

Use 4″ nominal dimension lumber as a minimum for all framing so that nails may be staggered in two lines.

Horizontal thrust

Ties will be plywood box beams so that they may also be designed as compression struts to resist wind forces acting on the 256′ sidesof the building.

T = Tension force at end of 64′ bay (outer diaphragms)

$$T = \frac{wB^2L}{4H} = \frac{(22)\,(20^2)\,(64)}{(4)\,(10)} = 14{,}000 \text{ lbs}$$

[T at ends of building]

$$T = 2 \times 14{,}000 = 28{,}000 \text{ lbs}$$

[other ties in outer diaphragms]

Therefore, ties and their connections should be designed for the maximum tensions as determined above.

Compression force in posts

(see Figure 15)

$$P = V_{max} \sin \alpha$$

A. For outer plates, $V_{max} = 704 \times \frac{B}{\cos \alpha}$

$$\text{Corner post force } P = \left(\frac{704 \times B}{\cos \alpha}\right) \sin \alpha$$

$$= (704B)\frac{H}{B} = 704H$$

$$P = 704 \times 10 = 7040 \text{ bs}$$

$$\text{Side post force} = 2 \times 7040 = 14{,}080 \text{ lbs}$$

B. For interior plates, $V_{max} = 1408 \times \frac{B}{\cos \alpha}$

End posts support 2 interior plates, and

$$P = 2\left(\frac{1480 \times B}{\cos \alpha}\right) \sin \alpha = 2816H$$

$$P = 2816 \times 10 = 28{,}160 \text{ lbs}$$

$$\text{Interior post force} = 2 \times 28{,}160 = 56{,}320 \text{ lbs}$$

Check: Total Load = (120) (256) (22) = 675,840 lbs

$$\text{Total of posts} = \underset{28160}{4 \times 7040} + \underset{84480}{6 \times 14{,}080} + \underset{112640}{4 \times 28{,}160} + \underset{337960}{6 \times 56{,}320} = 563{,}240 \text{ lbs}$$

(Continued next page)

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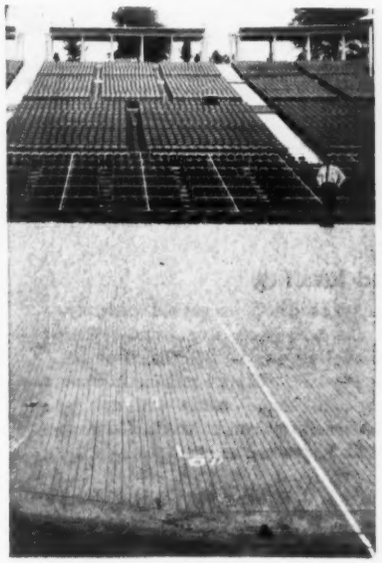

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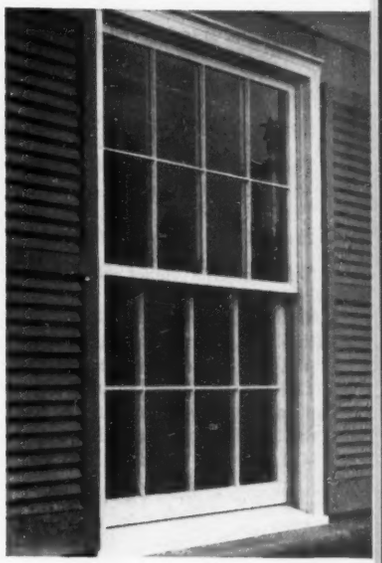

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Circle 5 for further information

Total of two side walls: $\frac{2wBL}{2} = \frac{2 \times 22 \times 20 \times 256}{2}$

$= 112{,}600$ lbs

Total of posts and walls = 675,840 lbs

If end walls and gable ends are load-bearing, loads on end and corner posts would be diminished accordingly.

Ridge and eave chords

(see Chord Stresses — Multiple Bay Roofs)

Ridge and Interior Valley Chord Force,

$$F = \frac{wBL^2}{4H} = 45{,}000 \text{ lbs}$$

Size of ridge chord $= \frac{45{,}000}{1200} = 37.5$ sq. in.

Therefore use 4″ x 12″ S4S Construction grade Douglas fir or structural lumber of equivalent working unit stress.

The ridge chords must be spliced for compression between the ends of the 64′ bays.

Size of interior valley chords $= \frac{45{,}000}{1500} = 30$ sq. in.

Since wood area will be less where the chord is spliced with shear plates and bolts, 4″ x 12″ S4S Construction grade Douglas fir valley chords are required.

The valley chords, in addition to being spliced for tension, must be designed to resist a splitting force normal to their grain equal to the horizontal component of S. Just as for the ridge, this force is:

$$S = \frac{wB}{2 \sin \alpha} = 492 \text{ lbs/ft and}$$

$$S_h = S \cos \alpha = 492(0.894) = 440 \text{ lbs/ft}$$

This force is assumed to be applied through the sheathing, as shown in the sketch.

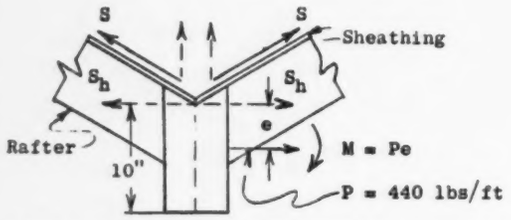


Figure 15A: Force applied through sheathing.

Based on a net depth of 10″ in the valley chord, the maximum stress perpendicular to the member is $\frac{P}{A} + \frac{Pec}{I} = 14.7$ psi. The average maximum tensile strength perpendicular to grain as determined for small, clear specimens of Douglas fir by the U.S. Forest Products Laboratory, Madison, Wisconsin, and given in the "Wood Handbook" (for sale by the Superintendent of Documents), is 340 psi at a moisture content of 12 per cent. Therefore, the 4″ x 12″ is adequate. In some cases additional stitch bolts may have to be used to prevent the valley members from splitting.

Deflection

d sin α = diaphragm deflection parallel to surface

v = 1408 lbs/ft

L = 64′

$b = \frac{B}{\cos} = \frac{20}{0.894} = 22.4'$

A = ½ of 4 × 12 = 20.8 sq in.

E = 1.6 x× 10^6 psi

G = 110,000 psi

t = 0.75″

e_n = 0.02″

sin = 0.447

$$d \sin \alpha = \frac{5vL^3}{8EAb} + \frac{vL}{4Gt} + .094Le_n$$

$$d \sin \alpha = \frac{5(1408)\ (64)^3}{8(1.6 \times 10^b)\ (20.8)\ (22.4)} + \frac{1408\,(64)}{4(110{,}000)\ (0.75)} + 0.094(64)\ (0.02)$$

$$d = \frac{0.70}{0.447} = 1.6'' = \frac{L}{480}$$

Horizontal wind loading

The triangular shaped stud walls sheathed with plywood combine with the box beam struts and act to distribute wind loads acting on the 256′ sides of the building to all plates. If wind forces are resisted in some other manner, these compression struts will not be necessary and simple tension ties can be used. However, the triangular stud walls also serve as draft stops in the event of fire.

Wind acting on the 256′ sides is analyzed as follows: (This method of analysis is probably conservative and may be modified as a result of experimental testing.)

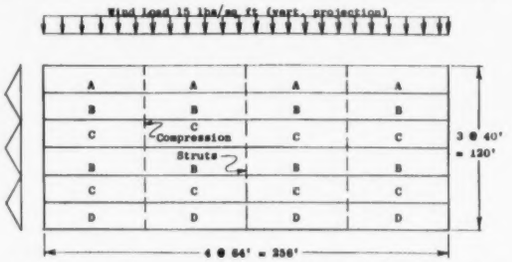


Figure 16: Location of diaphragm and struts for resisting wind. The inclined 20′ x 64′ diaphragms marked "A" resist the wind forces between struts which are spaced @ 64′. The end reactions from these "A" diaphragms are transferred into the entire 120′ x 256′ roof by means of the struts.

Wind shears

$$V_{max} = \frac{(64)}{2}\ (300) = 9600 \text{ lbs}$$

$$v_{max} = \frac{9600}{20} = 480 \text{ lbs/ft in "A" diaphragm}$$

$$V'_{max} = \frac{3 \times 19{,}200}{2} = 28{,}800 \text{ lbs}$$

$$v'_{max} = \frac{28{,}800}{120} = 240 \text{ lbs/ft in "A", "B", and "C" diaphragms}$$

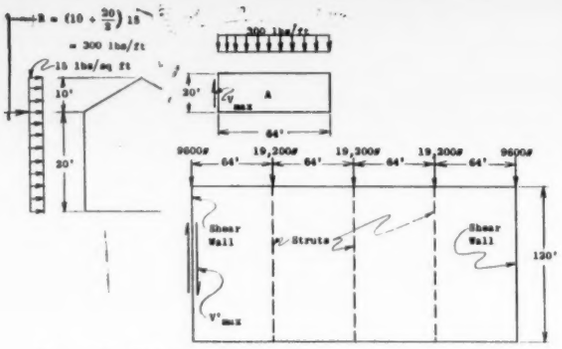


Figure 17: Distribution of wind forces.

∴ v_{max} in A diaphragm = 480 + 240 = 720 lbs/ft

The live load plus dead load (gravity) shears have been found to be 704 lbs/ft for the outer (A and D) diaphragms and 1408 lbs/ft for the interior diaphragms (B and C).

v_{max} due to LL (assumed not acting when maximum wind forces are acting) $= \frac{12}{22} \times 1408 = 768$ lbs/ft for interior plates and, $\frac{12}{22} \times 704 = 384$ lbs/ft for outer plates.

Wind shears in the "A" and "C" diaphragms oppose gravity shears; and their sum is less than DL + LL shears. Wind shears add to the "B" and "D" diaphragm gravity shears, however, as shown in the table below, their sum is also less than DL + LL shears.

Thus, the nailing schedule as determined for DL + LL is adequate to withstand wind forces. In fact, wind load would not govern until it reached 1.33 LL because of the one-third increase in nail bearing values allowed for wind loading.

Design of struts

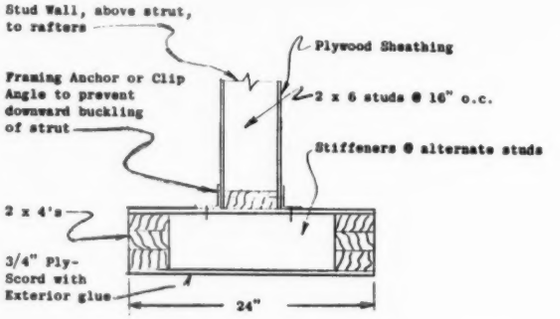
Compression = 19,200 lbs (wind load)

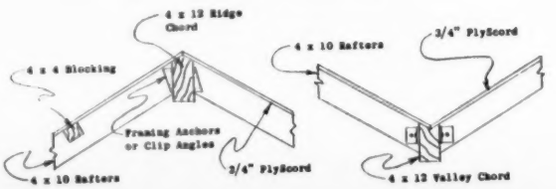
Tension = 28,000 lbs

Try a box section using f = 1200 psi (for trial design).

$$A_{req'd} = \frac{28{,}000}{1200} = 24 \text{ sq. in.}$$

Figure 18: Strut detail (below) fabricated as a box beam. Trial section to be checked for lateral buckling, stresses at connections, etc. Figure 19: (at bottom) Typical ridge and valley details.


Stud Wall, above strut, to rafters
Plywood Sheathing
Framing Anchor or Clip Angle to prevent downward buckling of strut
2 x 6 studs @ 16″ o.c.
Stiffeners @ alternate studs
2 x 4's
3/4″ Ply-Scord with Exterior glue
24″

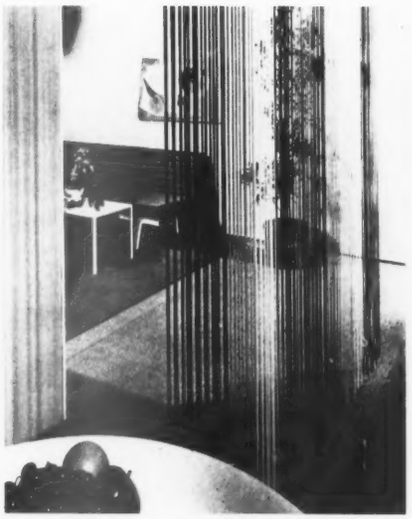


Tabulation of Diaphragm Shears

Diaphragm	*Shears lbs/ft*					
	Wind	*Live Load (LL)*	*Gravity (DL)*	*LL+DL*	*Gravity ± Wind*	*Maximum*
A	−720	384	320	704	−400	704
B	240	768	640	1408	880	1408
C	−240	768	640	1408	400	1408
D	240	384	320	704	560	704

products, equipment, materials

A/E NEWS offers editorial coverage of recent developments by industry. Inquiry cards for further information face pages 8 and 32.



Flexible steel streamers

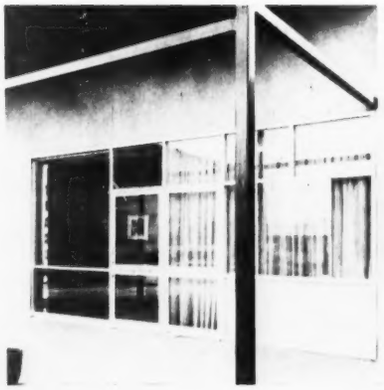
MFR'S DESCRIPTION: *Ribbon Wall* consists of ornamental, flexible steel streamers, designed to hang freely from ceiling track.

USES: room dividers and other decorative interior applications.

SPECS/FEATURES: broad or irregular stripes may be obtained in such colors as olive, orange, turquoise, blue, yellow, white and charcoal. Sixteen strips to the foot, a curtain 6′ x 8′ costs approx. $75. Ribbons will be cut to any desired length.
AIA file no. 15-H

MFR: HOWARD MILLER CLOCK CO.

Circle 21 for further information



Aluminum wall system

MFR'S DESCRIPTION: *Ador-Wall* is recent engineering approach to window wall installations, designed to offer design flexibility in simple structural system.

USES: one, two and three-story buildings of wood frame, steel, concrete or masonry construction.

SPECS/FEATURES: horizontal windows and vents are free of obstructions to maintain architectural sight lines. Basic 2″ x 4″ mullion system is used throughout. Utilizes any type panel ranging from 3/16″ to 3″ in thickness; and single, dual and triple glazing. System is designed for custom fitting and sizing to individual building specifications.
AIA file no. 17-A

MFR: ADOR CORP.

Circle 22 for further information

Reinforced sections

MFR'S DESCRIPTION: prefabricated metal forms, in one-piece units for reinforced concrete stairs, are now available.

USES: institutional, commercial and residential applications.

SPECS/FEATURES: *Stairbuilders* are complete with metal riser fronts, reinforcing and temperature rods, plate, channel or exposed stringers. Lower costs, both initial and in maintenance, accuracy in dimensions, properly spaced welded reinforcing, and design flexibility in riser, tread, stringer and railings are given as advantages. Further technical information is available.
AIA file no. 14-D

MFR: STAIRBUILDERS DIV., AMERICAN STAIR CORP.

Circle 23 for further information

Wall board finishes

MFR'S DESCRIPTION: *Trendwoods*, a recent development in the *Marlite* line of wood finishes, has been announced by Marsh Wall Products, Inc.

USES: interior wall applications.

SPECS/FEATURES: six finishes, Swiss walnut, American walnut, English oak, Danish birch, Swedish cherry and Italian cherry, are offered in three types of paneling: 16″ x 8′ planks, random grooved with tongue and grooved edges; 4′ x 8′ grooved panel, with tongue and groove on the 8′ edge; and 4′ x 8′ ungrooved panel, with square edges. All are ¼″ thick, with a tempered hardwood back. Gener-

ally, finishes have lighter color and stronger grain than previous finishes, according to mfr. Decorative grooves are intended to divide the 16" wide planks into an effect of different panel strips of varying widths. Planks can be applied directly to solid backing with adhesive and clips. Horizontal furring strips placed 16" apart are suggested if existing walls are uneven. Tongue and groove edges are stated to facilitate installation, using only ordinary carpenter's tools. Mfr states matching cove, corner, division, edging and moldings are available, along with installation instructions. All units have baked melamine plastic surface, designed to resist stains and mars; further painting is unnecessary, and cleaning requires only a damp cloth, according to mfr.
AIA file no. 23-L

MFR: MARSH WALL PRODUCTS, INC.
Circle 24 for further information

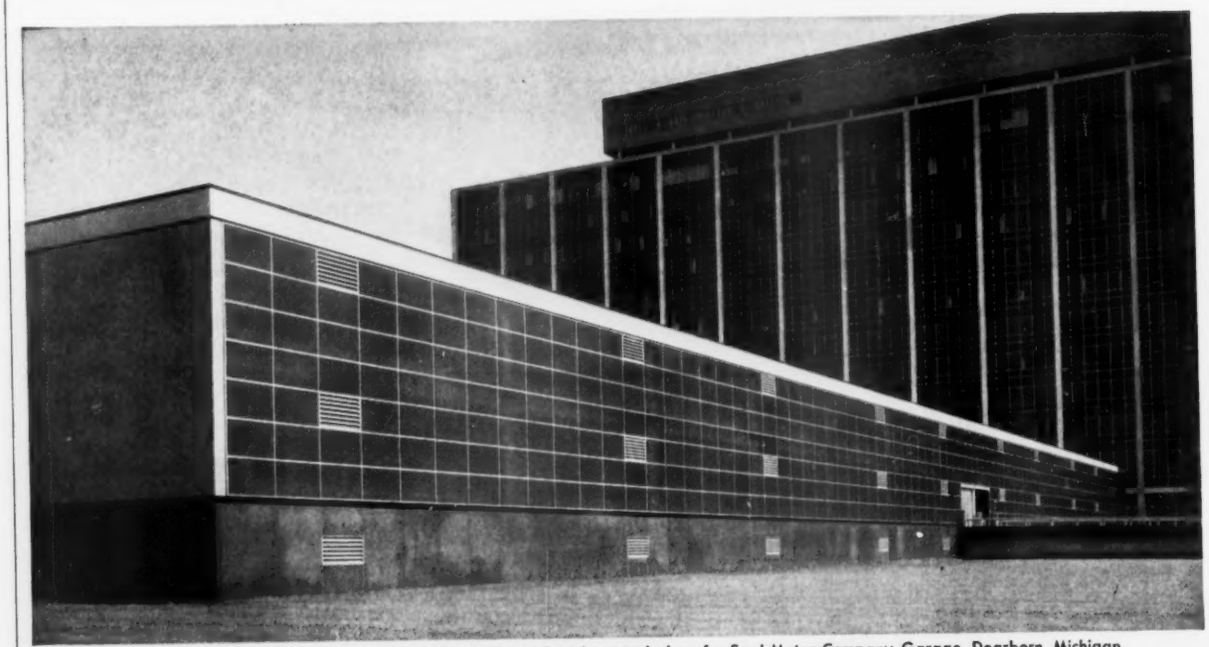
Solar shading system

MFR'S DESCRIPTION: *Sol-Dec* is aluminum sun-shading and decorative wall system.

USES: decorative panels, facades, barriers, etc. for new and old buildings, cooling towers, elevator penthouses, lobby walls, etc.

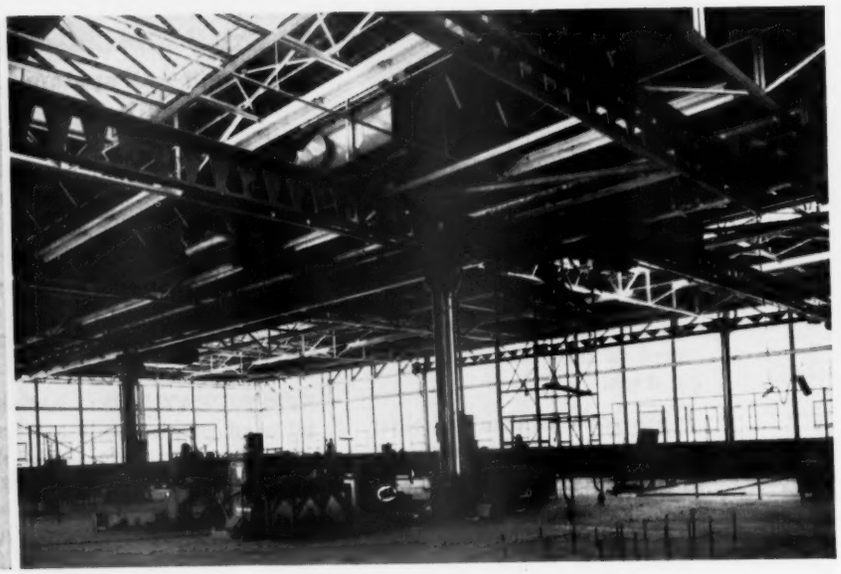
SPECS/FEATURES: system is composed of three extrusions—clip angle, miniature I-beam and panelette. Ease of installation has been achieved through simple fastening method of panelettes to I-beams which are attached to building facade on 8" module. Panelettes are then locked in place, using only pliers. Panelettes are supplied in *Alumalure* colors, a baked enamel finish. Clip angles and I-beams are natural aluminum. Eleven standard patterns are offered, but range of designs is

MORE *Daylight* PER DOLLAR WITH



Glare reduced Coolite glass achieves high levels of illumination without heat and glare for Ford Motor Company Garage, Dearborn, Michigan.
Glazier: Pittsburgh Plate Glass Co., Detroit

Coolite, Heat Absorbing Glass, glare reduced on the pattern side, provides ideal daylighting for Johnson Motors, Waukegan, Illinois. Architect: Shaw, Metz & Dolio. Contractor: Campbell, Laurie & Lautermilch. Glazier: Waukegan Glass Co.



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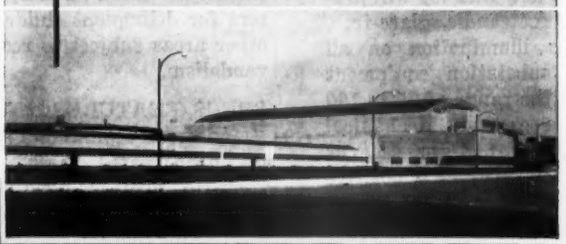
TRANSLUCENT GLASS

Modern Buildings Utilize Diffusing Glass to Make the Most of Daylight

These outstanding buildings enjoy more and better daylighting per glazing dollar because translucent glass diffuses daylight deep into interiors to achieve even, comfortable, overall illumination at low cost. Areas are flooded with inexpensive, natural lighting, free of raw glare. Sharp shadows and contrasts are reduced to make seeing tasks easier. Translucent glass helps create a feeling of spaciousness and comfort. Occupants see better, feel better, work better under improved daylighting. The resulting efficiencies and improved morale make it good business to install translucent glass.

Today's leading architects are taking fullest advantage of translucent glass to achieve interesting, highly functional structures that provide high levels of low cost, natural illumination. Specify glass by Mississippi. Available in a wide range of patterns and surface finishes to solve any daylighting requirement.

Coolite, Heat Absorbing glass, glare reduced, installed in the Twin Disc Clutch Company, Racine, Wisconsin, floods work areas with conditioned daylight . . . absorbs up to 50% of unwanted solar heat. Glazier: Pittsburgh Plate Glass Co.



35,000 sq. ft. of Smooth Rough glass in the Kentucky Fair and Exposition Center, Louisville, Ky., brightens entire interior.
Architect: Fred Elswick and Associates of Louisville
Photo by: Royal Photo Co.

GLASS COMPANY

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ROLLED, FIGURED AND WIRED GLASS

Circle 6 for further information

almost limitless.
AIA file no. 35-P-2
MFR: ALUMINUM CO. OF AMERICA
Circle 25 for further information

Rubber control joints

MFR'S DESCRIPTION: *Rapid Wide Flange* rubber control joints have *Neoprene* compound flanges that expand and contract with joint, maintaining a perpetual seal.

USES: masonry wall installations.

SPECS/FEATURES: caulking is not necessary in standard concrete block construction. *Neoprene* is resistant to flex-cracking, heat and cold, withstands severe weather and is not harmed by oil or solvents. Concave edge allows easy compression, and application is rapid and uncomplicated. Available in 32" lengths.
AIA file no. 7-C
MFR: CEDAR RAPIDS BLOCK CO.
Circle 26 for further information

Wood acoustical tiles

MFR'S DESCRIPTION: *Hansostar* line, perforated wood fiber acoustical tiles, are offered.

USES: soundproofing installations.

SPECS/FEATURES: tiles utilize holes of varied diameters, approximately 1,500 psf, as sound traps. Finish is washable, resembling textured plaster ceiling from most viewing angles. Available in ½" x 12" x 12" size for either glue, staple or mechanically suspended application. Tiles are washable and repaintable without loss of acoustical efficiency. Noise reduction in range of .60 to .65 is claimed.
AIA file no. 39-B
MFR: ELOF HANSSON, INC.
Circle 27 for further information

Delayed action tape

MFR'S DESCRIPTION: *Dul-*

products, equipment, materials

seal, transparent adhesive film with delayed setting action to facilitate accurate positioning, is now available.

USES: application on frequently handled documents, maps, drawings, etc., and notices and documents for outdoor display.

SPECS/FEATURES: film is available as a mending tape, also in sheets and rolls. When wax coating is removed from *Dulseal*, it can be approximately positioned; can be readjusted for following 24 hour period, until permanent setting occurs. Film is washable, waterproof and chemically stable. Surface can be marked by either pen or pencil, and erasures can be made. Supplied with dispenser which removes wax backing.
AIA file no. 35-H-4

MFR: KEUFFEL & ESSER CO.
Circle 28 for further information

Water barrier

MFR'S DESCRIPTION: *Aquatyte* is intended to make masonry entirely waterproof and stop all seepage and flow through brickwork, concrete and stonework.

USES: basements, tunnels, mines, swimming pools, silos and other sub-structures.

SPECS/FEATURES: material is mixed with cement, sand and water, and troweled on wall surface. Drys to adherent bond with smooth surface the color of Portland cement. Achieves stoppage through paralleled arrangement of crystalline structure of cement. Most effective when cement reaches maximum hardness and strength. Composition of inorganic materials stated to be indestructible with time.
AIA file no. 3-B-2

MFR: DAKOTA ENGINEERING, INC.
Circle 29 for further information

LIGHTING SPECIALTIES

Substation fixture

MFR'S DESCRIPTION: a recent development in lighting equipment for outdoor switching stations and substations is the Holophane *#04252*, consisting of a one-piece refractor with removable prismatic lens top.

USES: outdoor substation fixture.

SPECS/FEATURES: former designs of outdoor substation units were limited to lateral light distributions with maximum candlepower peaking at 105° or 15° above horizontal. New unit produces two peaks of maximum candlepower, one at 105°, and another at 180°, or directly above the fixture. Distributions are built into optical design of the complete prismatic refractor with top lens assembly so that all types of stations can be lighted effectively regardless of heights of disconnect switches. Use of the new lens top will provide high footcandle, glare-free, shadowless illumination on all overhead substation equipment located in the range of 25 to 100 feet above ground. Mechanical assembly, designed for ease of maintenance, utilizes a positive seating slip fitter on the fixture base suitable for bracket or post top mounting and a removable top lens assembly. *Endural* glass, known as a thermally stable glass is used in the reflector and lens top. Other engineering data and details available.
AIA file no. 31-F-2

MFR: HOLOPHANE CO.
Circle 30 for further information

Hospital service unit

MFR'S DESCRIPTION: *Centron-10* is totally integrated hospital bedroom, console type service unit incorporating ten services normally installed separately.

USES: hospitals and other large sick-room applications.

SPECS/FEATURES: contained in one unit are a general illumination unit, shielded reading light, color-corrected examination light, night lights, convenience outlets, provision for nurse-call system, N. C. G. oxygen and vacuum systems, television lead-ins, phone outlets and accessory intravenous apparatus support arm. Unit requires only eight service lines because of its prewired construction. Heavy gauge steel unit has depth of 7". Lighting ciruits and convenience outlets operate on standard 110 v current, and meet requirements of UL and Fire Underwriters.
AIA file no. 31-F-28

MFR: SUNBEAM LIGHTING CO.
Circle 31 for further information

Non-removable fixture

MFR'S DESCRIPTION: *53-40 Line*, lighting fixture, designed to meet exceptionally rigid requirements for maximum security areas.

USES: prison cells, psychopathic wards, detention buildings, shelters for delinquent children and other areas subject to recurring vandalism.

SPECS/FEATURES: features one-piece cast aluminum housing of heat-treated high tensile strength alloy, rugged non-removable 10-gauge perforated steel protective guard, having 48 per cent open area over ¼" clear *Herculite* glass plate and high-stress *Holophane Controlens*, 150 watt incandescent lamp and specular anodized aluminum reflector. Fits snugly between wall and ceiling, thereby preventing concealment of tools or weapons. Optional front or back access; 6" square access hole in rear of fixture permits relamping from outside of cell. Back access feature is necessary in areas housing violent or dangerous persons.
AIA file no. 31-F-28

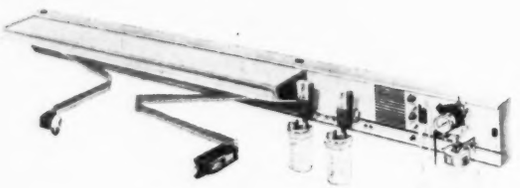
MFR: MCPHILBEN LIGHTING, INC.
Circle 32 for further information

Fluorescent luminaires

MFR'S DESCRIPTION: *Regula* and *Visitron* are added to *Designer Group* of fluorescent luminaires of recent design.

USES: commercial lighting applications.

30



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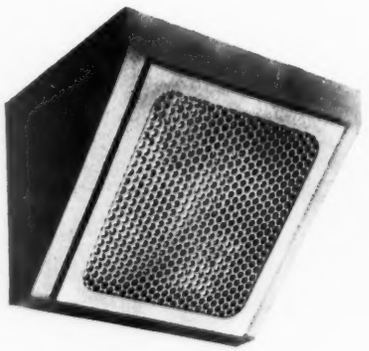


32

33

SPECS/FEATURES: *Regula* features crystal plastic prismatic refractor to blend with modern decor while enclosing luminaire to minimize maintenance. *Visitron* (illustrated) features white plastic diffuser which also encloses lamp to prevent entry of almost all foreign matter. Shallow units are available for two or four 40 watt fluorescent lamps; may be installed individually or in continuous rows. Plastic enclosures are guaranteed against warpage and discoloration for five year period.
AIA file no. 31-F-21

MFR: CURTIS-ALLBRITE LIGHTING, INC.
Circle 33 for further information

Emergency floodlights

MFR'S DESCRIPTION: *Fire-Chief*, lightweight portable floodlights, are added to line of emergency equipment.

USES: emergency lighting needs.

SPECS/FEATURES: line includes units ranging from 500-watt portable, producing 121,500 candlepower, to 1¼ lb, 150-watt unit. *Fire-Chief* units are lightweight, designed to travel with fire fighting units. Floodlights adjust easily for any lighting position and are equipped with large cast aluminum positioning knobs for focus locking at any angle. They are weatherproof, corrosion-proof aluminum with cooling ribs for rapid heat dissipation. Accessories include wire guards, clear and colored protective lenses, etc.
AIA file no. 31-F-22

MFR: STONCO ELECTRIC PRODUCTS CO.
Circle 34 for further information

Floodlights

MFR'S DESCRIPTION: *Quad* floodlighting line, in incandescent, mercury vapor and bi-post lamp units, has been redesigned and improved.

USES: industrial and sports lighting.

SPECS/FEATURES: among items available are: (1) medium beam reflector which provides illumination for broad areas at medium range; (2) long beam reflector which utilizes inner beam projector of *Alzak* aluminum to project light outward; and (3) diffusing floodlight for close range lighting—able to deliver candle power between 0° and 45°. Units are available in rectangular and elliptical designs, in medium beam, long beam or as diffusing types. All units are suitable for open or concealed wiring for single, double or triple mounting. Open-wiring units have porcelain bushed wireways; two and three light units are equipped with integral wiring boxes. Brackets may be mounted by clamping around 1½" to 2½" pipe standards, mounted on walls, cross arms or any flat surfaces. Enclosed-wiring units fit over 2" pipe and have wiring space with removable covers. Further illumination data is available.
AIA file no. 31-F-22

MFR: QUADRANGLE MFG. CO.
Circle 35 for further information

PLASTICS

Flexible sealer

MFR'S DESCRIPTION: *Formica Wall Tile Seam Finish* is a watertight, flexible sealing compound to be used with *Formica* wall tile.

USES: sealer for bathroom wall tiles.

SPECS/FEATURES: made with elastomeric material with water as the vehicle, material is white with consistency of heavy paste. Tests indicate material has good flexibility and adhesion to edges of wall tile, and will expand or contract with the tiles. Will not dry to a brittle consistency, but maintains flexibility. Five ounce tube costs approximately $1.50. Shown is product's expansion-contraction flexibility.
AIA file no. 7-D

MFR: FORMICA CORP., SUBS. AMERICAN CYANAMID CO.
Circle 36 for further information

Waterproof coating

MFR'S DESCRIPTION: *Tile Kote*, interior and exterior coating, is synthetic resin of thermo-setting type, applicable by spray, roller or brush, with curing time of one to four hours. Stated to provide permanent, waterproof, corrosion and abrasion resistant finish.

USES: coating for masonry, concrete and cinder block, cement asbestos board and most other building materials.

SPECS/FEATURES: supplied in all colors and tints, product may be modified to provide porcelain-like gloss, semi-gloss or flat finish. Non-absorptive, waterproof surface is unaffected by oils, greases, paints, blood, acids, solvents and alkalis.
AIA file no. 25-B-39

MFR: GRANT CHEMICAL CO., INC.
Circle 37 for further information

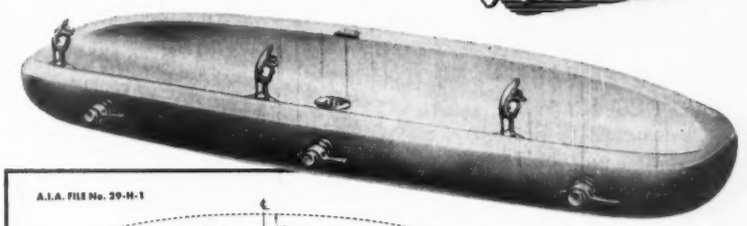
Plastic treatment

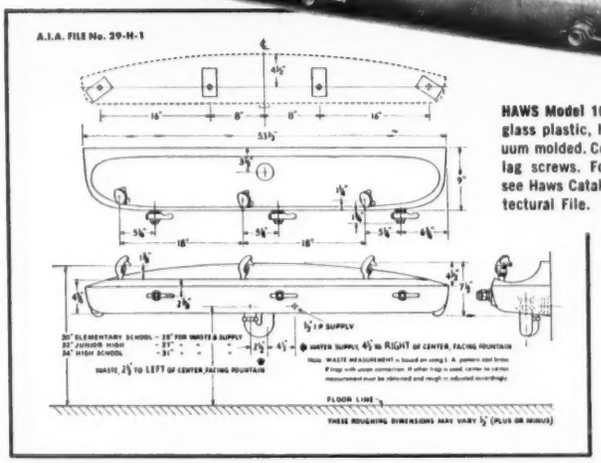
MFR'S DESCRIPTION: technique, giving high relief to flat extruded sheet of Tenite (R) butyrate, has been developed.

USES: sign and display faces, screens, furniture panels, equipment housings, and other applica-

MOLDED IN FIBERGLASS

in choice of **COLORS** HAWS





HAWS Model 10Y: reinforced fiberglass plastic, heat laminated, vacuum molded. Concealed hanger and lag screws. For complete details see Haws Catalog in Sweet's Architectural File.

In fiberglass, in color... and a design as fresh as the latest architectural trends! HAWS Model 10Y brings welcome beauty and color appeal to school and institutional environments. It's vacuum molded in tough, lightweight, acid resisting fiberglass —with smooth lines and 100% concealed trim. HAWS vandal proof, shielded bubblers are anti-squirt, with HAWS Flow Controls. Choose from five decorator colors and white at no extra cost! Write for the complete specs on Model 10Y (and also Model 10X, the same fine design in enameled iron).

See HAWS Catalog in Sweets Architectural File for data on the entire Haws line.

HAWS DRINKING FAUCET COMPANY
1441 FOURTH STREET • BERKELEY 10, CALIFORNIA
Circle 7 for further information

tions where decorative backgrounds are appropriate.

SPECS / FEATURES: near limitless range of colors and color effects, as well as special formulations for outdoor use, is available. Technique permits reproduction of woven wire screening, striated fiberboard, metal rings, etc., on butyrate sheet in seconds. Further information is available.
AIA file no. 24-B

MFR: EASTMAN CHEMICAL PRODUCTS, INC.

Circle 38 for further information

Plastic gutter guard

MFR'S DESCRIPTION: plastic guard designed to prevent clogging of roof gutters, is made of Du Pont *Alathon,* polyethylene resin.

USES: roof installation to prevent clogging of twigs, leaves, etc.

SPECS/FEATURES: design is based on tube-like section, split down one side. When laid lengthwise in gutter it forms tunnel. Installed, guard arches high enough above gutter edges to provide natural slope. Water flows over guard and enters gutter through ports around tube's open side. Unit is rustproof, flexible and can be cut with pocket knife. Lightweight facilitates removal for repairs or painting of gutter. Tests show guard also prevents clogging of snow and ice.
AIA file no. 12-P

MFR: E. I. DU PONT DE NEMOURS & CO.; JO-LI-ET GUTTER GARD CORP.

Circle 39 for further infromation

OFFICE AIDS

Drafting aid

MFR'S DESCRIPTION: Charles Bruning Co. has announced the *Neoglide,* drafting machine, de-

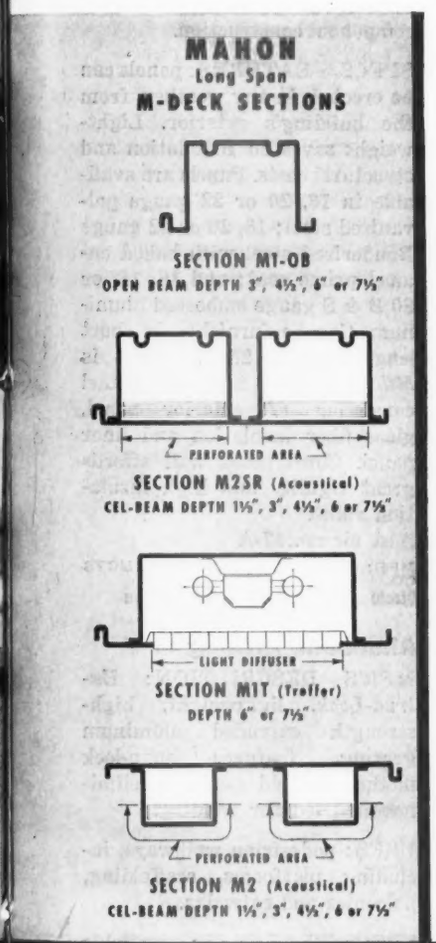
M-DECK Provides Roof Structure a

Entrance Foyer of Men's Intramural Building, Michigan State University, Lansing, Mich. The building houses Classrooms, Swimming Pool, and other Sports and Conditioning Facilities. 89,200 Sq. Ft. of Mahon Acoustical M-Deck was used in the construction of the Combined Roof-Ceiling. Mahon also Fabricated and Erected 830 Tons of Structural Steel for this project. Lewis J. Sarvis, Architect. Granger Brothers Inc., Gen. Contrs.

Serving the Construction Industry Through Fabrication of Structural Steel, Steel Plate Components, and Building Products

and Acoustical Ceiling Combined at Michigan State University!

Acoustically Treated Cellular Deck Sections Present an Attractive Ceiling with Recessed Lighting



At Left: Cross Section of Long Span M-Deck Combined Roof-Ceiling with Troffer Lighting.

☆ **OTHER MAHON BUILDING PRODUCTS and SERVICES:**

- M-Floors (Electrified Cellular Steel Sub-Floors)
- Insulated Metal Curtain Walls
- Underwriters' Rated Metalclad Fire Walls
- Rolling Steel Doors (Standard or Underwriters' Labeled)
- Steel Roof Deck
- Permanent Concrete Floor Forms
- Acoustical and Troffer Forms
- Acoustical Metal Walls and Partitions
- Acoustical Metal Ceilings
- Structural Steel—Fabrication and Erection
- Steel Plate Components—Riveted or Welded

☆ *For INFORMATION See SWEET'S FILES or Write for Catalogues*

THE R. C. MAHON COMPANY • Detroit 34, Michigan
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Representatives in all Principal Cities

MAHON

of Steel and Aluminum

Circle 8 for further information

products, equipment, materials

signed for use on any drafting board at any angle without need of adjustment.

USES: drafting room uses in architectural and engineering firms.

SPECS/FEATURES: termed a departure from conventional drafting machine design, *Neoglide* has enclosed counterweight unit to provide positive counterbalancing at any angle from horizontal to vertical. Mfr claims installation consists only of placing two screws to hold corner braces over top board corners. All standard board sizes are available; special sizes can be obtained.
AIA file no. 35-H-3

MFR: CHARLES BRUNING CO.

Circle 40 for further information

Premarked paper

MFR'S DESCRIPTION: *Pre-Print* paper provides a pre-print of recurring typical details, basic standards, title block information, legends, symbols, etc.

USES: drafting and engineering offices.

SPECS/FEATURES: *Fadeout* process prints items of frequent recurrence; details must be pencilled or inked over to appear in final printing. Repeated erasures are possible without destroying guide lines.
AIA file no. 35-H-3

MFR: CLEARPRINT PAPER CO.

Circle 41 for further information

Marking pencil

MFR'S DESCRIPTION: *Mars-Omnichrom* is all-purpose marking pencil, able to make both fine and heavy notations on any type of surface.

USES: drafting offices.

SPECS / FEATURES: though able to mark on virtually every

surface, product is same size as common pencil. Unlike bulky, paper-wrapped grease pencils, product is able to make fine marks on glossy surfaces; can be sharpened in ordinary pencil sharpener without danger of clogging working parts. Seven colors available. Samples may be obtained.
AIA file no. 35-H

MFR: J. S. STAEDTLER, INC.
Circle 42 for further information

Erasable color pencils

MFR'S DESCRIPTION: *Col-Erase,* colored pencil with lead formulation designed to permit erasing, is announced by Venus Pen and Pencil Corp.

USES: office aid for architectural and engineering firms.

SPECS/FEATURES: water resistant leads are result of recent process which permits erasure with ordinary eraser. Available colors are blue, vermilion, carmine red, green and yellow. Designed to make smooth brilliant markings in addition to maintaining sharp point. Samples are available.
AIA file no. 35-H-4

MFR: VENUS PEN AND PENCIL CORP.
Circle 43 for further information

Improved adding machine

MFR'S DESCRIPTION: architects' adding machine, capable of adding and subtracting feet, inches and fractions of inches without converting common fractions to their decimal equivalents, is offered in expanded range of prices, capacities and model styles.

USES: architectural and engineering firms.

SPECS/FEATURES: suitable for normal office figure work, machine also manifests accuracy in computing technical problems common to architectural and engineering offices. Feet, inches and fractions of inches (16ths, 8ths, 4ths or ½'s) can be entered into machine's full keyboard without converting to decimal equivalents; additions and subtractions can be interspersed within a problem. Machine's three right-hand columns are used to enter inches and fractions of inches; when routine accounting problems are figured, these columns are not used. Recent models include the *Imperial* and *Custom* lines, with prices starting at $208.00 for machine with a capacity of 999,999' 11 15/16". Largest available machine sells for $410.00 and has capacity of 99,999,999' 11 15/16. Cases are aluminum; interior parts are cadmium plated to resist rust. Further information available.
AIA file no. 35-H-4

MFR: VICTOR ADDING MACHINE CO.
Circle 44 for further information

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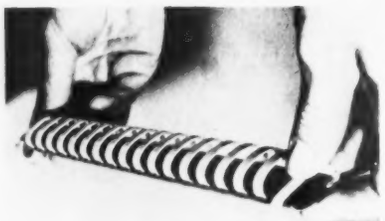

Plastic binding

MFR'S DESCRIPTION: *GBC Zip-Lox* is loose-leaf plastic binding designed to meet the production speed required by plant and office binding machines while enabling anyone to quickly remove or add pages without special equipment.

USES: binding in office or field.

SPECS/FEATURES: unit is said to incorporate only mechanical plastic loose-leaf binding locks now available. Two locks, one at each end, secure binding's fingers to backbone. Locks can be released instantly with gentle thumb pressure on each lock. Plastic strip containing fingers then slides off zip track, permitting additions or removals. Backbone's flat design is suitable for title silk screening. Plastic rings are spaced 19 to the 11" sheet size for firm grasp; added strength is achieved by rectangular shape. Pages may be turned easily and will lie flat. Binding is made of vinyl copolymer compound.
AIA file no. 35-H-4

MFR: GENERAL BINDING CORP.
Circle 45 for further information

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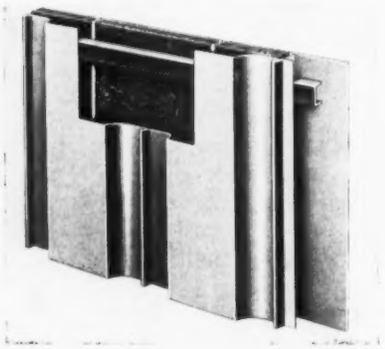

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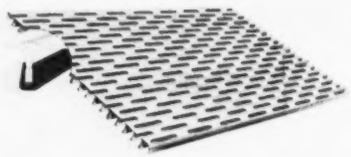

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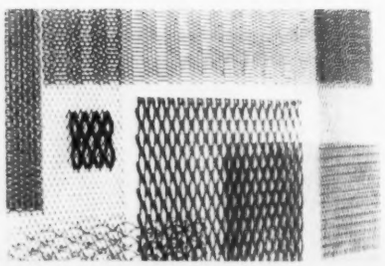

METAL UNITS

Steel wall panels

MFR'S DESCRIPTION: *Milcor* steel wall panels, designed for either insulated or uninsulated use, are available. *EW* is exterior panel; *EDW*, complete wall component, with or without insulation.

USES: variety of industrial and commercial applications utilizing component construction.

SPECS/FEATURES: panels can be erected, in any weather, from the building's exterior. Lightweight saves on foundation and structural costs. Panels are available in 18, 20 or 22 gauge galvanized steel; 18, 20 or 22 gauge Bonderized steel with baked enamel prime coat; and 16, 18, or 20 B & S gauge embossed aluminum. Can be furnished in sheet lengths up to 28'6". Shown is *Milcor EDW*, insulated panel consisting of exterior panel, glass fiber insulation and liner panel. Constructed wall affords great rigidity and high insulation value.
AIA file no. 17-A

MFR: INLAND STEEL PRODUCTS CO.
Circle 46 for further information

Aluminum grating

MFR'S DESCRIPTION: *Extrud-Lock*, lightweight, high-strength extruded aluminum grating, features snap-lock method of field assembly, eliminating need for welding.

USES: pedestrian walkways, including platforms, scaffolding, balconies and catwalks.

SPECS/FEATURES: available in 1", 1¼" and 1½" thicknesses, in 6" wide extrusions in any specified length, grating requires no power tools or welding equipment. Fastening method consists of aluminum clip, hammered into place, which ties together interlocking I-beams on mating edge of each section. Recommendations are made for applications where lightweight combined

with corrosion resistance, low maintenance, non-sparking and non-slippage is desirable. Typical 3′ walkway said to support 350 lbs/sf. Engineering and specification details available.
AIA file no. 14-A-1

MFR: READ STANDARD DIV., CAPITOL PRODUCTS CORP.

Circle 47 for further information

Enameled metal sheets

MFR'S DESCRIPTION: method of porcelain enameling expanded metal sheets for architectural applications has recently been developed.

USES: decorative panels, enclosures and partitioning screens, including grilles and sunshades.

SPECS / FEATURES: recent process assures uniform coverage and durability; is applicable to either steel or aluminum metals, in a varied range of colors. Sheets are supplied in 3′ x 8′ or 4′ x 8′ sizes enameled in one of several patterns.
AIA file no. 15-M-1

MFR: INGRAM-RICHARDSON MFG. CO.

Circle 48 for further information

FLOORS

Vinyl asbestos tile

MFR'S DESCRIPTION: Carpet Tones patterns, recently added to *Vina-Lux* line of vinyl asbestos floor tile, are designed to present appearance of carpeting.

USES: commercial, institutional and residential applications.

SPECS/FEATURES: added designs are: *V-201 Baghdad*, brown with beige nap effect; *V-202 Beirut*, cream with beige nap effect; *V-203 Damascus*, grey with dark grey nap effect; and *V-204 Teheran*, rose with brown nap effect. Patterns are available in standard 9″ x 9″ size, 1/16″ thickness.
AIA file no. 23-G

MFR: AZROCK FLOOR PRODUCTS DIV., UVALDE ROCK ASPHALT CO.

Circle 49 for further information

Tile patterns

MFR'S DESCRIPTION: *Cellini Metaltone, Byzantine, Mosaics, Custom Cloud Pompeiian* and *Queen Anne* patterns have been added to vinyl tile flooring line.

USES: residential, institutional and commercial applications.

SPECS/FEATURES: patterns are available in assorted colors and color combinations, suitable for varied type installations. Tile is treated with sanitized, hygienic additive which inhibits germ growth, bacteria, mildew and mold. Mosaic pattern style is resilient tile suitable for both floor and wall applications. Squares and rectangles of ⅛″ gauge vinyl make up the 12″ x 12″ tiles which have adhesive backing.
AIA file no. 23

MFR: ROBBINS FLOOR PRODUCTS, INC.

Circle 50 for further information

CONSTRUCTION

Form tie

MFR'S DESCRIPTION: *Plasti-Cone*, break-back form tie, is designed to produce a positive break-off 1″ or 1½″ back from surface of finished concrete.

USES: residential and light construction work.

SPECS/FEATRUES: product incorporates molded polyethylene cone which is inserted in each end of form tie. This envelops tie from point of break-off, out to surface of wall, preventing excess bleed at tie-slot. Can be removed with almost no spalling, immediately after stripping forms, enabling filling and grouting on green concrete. Cones need not be oiled or specially treated, since concrete cannot adhere to smooth surface.
AIA file no. 4-D-3

MFR: GATES & SONS, INC.

Circle 51 for further information

Multipurpose straightener

MFR'S DESCRIPTION: The *Straight-O-Flex* straightener, of interest to construction supervisors, is recently developed tool for straightening a variety of parts and fabricated sections.

USES: straightening stair stringers, channel door frames and similar uses.

SPECS/FEATURES: tool is easily transportable because of weight of only 22 lbs. Work to be straightened or curved bears on two adjustable support blocks, and pressure is applied by a lever, acting through an eccentric shaft which carries a roller-bearing-mounted pressure roll. Because of high lever ratio, pressure of 5 tons can be applied. Frame, support blocks and operating lever are aluminum alloy. Adjustable blocks provide for 63 working heights between surfaces of support blocks and pressure roll, giving a maximum of 2⅝″ and minimum of ⅛″. Frame width is 19″, frame height 11″, and lever is 26″ long. Adaptations will be made to order.
AIA file no. 35-i-25

MFR: ARCHITECTURAL IRON, INC.

Circle 52 for further information

ELECTRICAL

Low-voltage substation

MFR'S DESCRIPTION: *Power-Zone* package unit, low-voltage substation for use on 480 volt systems to supply 120/208Y circuits, is now available.

USES: lighting, office equipment and similar loads.

SPECS/FEATURES: units contain three-phase transformers from 75 KVA to 300 KVA. Sound levels have been reduced to 45 db for sizes up to 150 KVA, 52 db for 225 KVA and 56 db for 300 KVA. Unit is 60″ long, 36″ deep and 79½″ high. Up to 72″ of panel space is available for molded case circuit breakers.
AIA file no. 31-B

MFR: SQUARE D CO.

Circle 53 for further information

Weatherproof fuse block

MFR'S DESCRIPTION: line of fuse-switch assemblies and fuse-receptacle assemblies designed to block short circuits, overloading, etc., is offered.

USES: fuse protection wherever moisture is a problem.

SPECS/FEATURES: UL ap-

Rosboro Timber Fabrication

Rosboro owns and logs its own timber from a sustained yield of old growth Douglas Fir. This assures a dependable and uniform quality for all types of structures.

Rosboro's fabrication crew has almost two decades of experience in engineered timber fabrication. The department is a unit of our mill at Springfield, Oregon, taking advantage of a large inventory, storage and shipping facilities. Rosboro can fabricate all types of solid sawn trusses and roof structures to meet your needs for modern engineering in wood.

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State_____

Circle 9 for further information

products, equipment, materials

proved units can be installed in either 2-gang box or any flatface FS fitting. *WF74-2* dual fuse box is made of .040" brass and spray-finished in corrosion-resistant aluminum. Unit is supplied with die-cast aluminum covers, weatherproof rubber gasket and mounting screws. *Perfect-Line Lt-11*, 2-gang box is also available.
AIA file no. 31-D-9
MFR: PERFECT-LINE MFG. CORP.
Circle 54 for further information

Safety switches

MFR'S DESCRIPTION: light and heavy duty safety switches, incorporating innovations for safety in operation and installation, are now available.

USES: switching and related protective units.

SPECS/FEATURES: ratings for the heavy duty switches *(Type TH)* are 250 and 600 volts ac, 30 to 600 amps. Light duty *(Type TG)* devices extend from 30 to 600 amps, 120/240 and 240 volts ac. Innovations include elimination of fiber parts from operating mechanism, visible blades, wiring gutters free from moving parts or obstructions, safety phase barrier which protects maintenance personnel and highly visible red insulated front-operating handle and large metal nameplate to provide on-off identification from over 100' away.
AIA file no. 31-D
MFR: GENERAL ELECTRIC CO.
Circle 55 for further information

Lightweight transformer

MFR'S DESCRIPTION: small size, lightweight, constant wattage, two-lamp, weatherproof mecury vapor transformer available from Sola Electric Co.

USES: mercury lamps.

SPECS/FEATURES: unit is emphasized as being both smaller and lighter than previous models, due to design innovations and class-B insulation. Contrasted with previous model's weight of 70 lbs, present unit weighs only 48 lbs; diameter is reduced from 8⅜" to 6⅝". Mfr claims size reduction results in substantial savings in time, cost and effort required for handling, shipping and installation. Other advantages emphasized are extended lamp life and high lumen maintenance over useful lamp life. According to mfr, improved lamp wattage regulation results in less than plus or minus 1 per cent variation in rated lumen-output, even with line voltage fluctuations as great as plus or minus 13 per cent.
AIA file no. 31-B
MFR: SOLA ELECTRIC CO.
Circle 56 for further information

Elbow connections

MFR'S DESCRIPTION: the "JIC" 90° pulling elbow is offered and described by the Appleton Electric Co. as liquid-tight, weather proof, and dust-tight.

USES: with 90° connections using liquid-tight conduit in limited space.

SPECS/FEATURES: large cover opening offers ease of access for pulling wires in any installation while solid neoprene gasket provides seal against damaging elements, liquids, fumes and other foreign matter. Designed for outdoor or indoor connections.

Wiring chamber has chamfered edges—to eliminate burrs and sharp edges which may damage wires. Available in ½", ¾", and 1" sizes. All units have male threaded ends to fit standard conduit hubs of any type of junction box.
AIA file no. 31-C
MFR: APPLETON ELECTRIC CO.
Circle 57 for further information

INTERIOR ITEMS

Aluminum furniture

MFR'S DESCRIPTION: *Modalum* series is integrated group of furniture pieces based on aluminum modular structural system.

USES: commercial interiors, such as reception rooms, lobbies, offices, sales rooms and conference rooms.

SPECS/FEATURES: George Kasparian designed system permits flexibility in mounting combinations of pieces. Series includes single chair, multiple seaters, two lounge chairs, coffee table, corner table, table with pull-out drawer, conference/dining table and upholstered bench. Aluminum framework is ⅞" square extruded bar stock (6063-T5 Alloy). Upholstering is foam rubber over rubber webbing and polyether foam. Wood surfaces are walnut.
AIA file no. 35-H-41
MFR: KASPARIANS
Circle 58 for further information

Towel rings

MFR'S DESCRIPTION: three towel rings with sea theme have been added to present line.

USES: bathrooms, dressing rooms, etc. in motels, apartments, hotels and homes.

SPECS/FEATURES: Mermaid, Dolphin and Sea Shell models available, in plated gold, brass or chrome finish. Designed to blend with bathroom interiors. Shown is Sea Shell accessory.
AIA file no. 29-J
MFR: HALL-MACK CO.
Circle 59 for further information

Clocks

MFR'S DESCRIPTION: the Howard Miller Clock Co. has added five models to its *Lifetime* line.

USES: decorative interior uses.

SPECS/FEATURES: ranging in price from $49.50 to $79.50, clocks are designed to harmonize with home furnishings. Four of the models are for wall mounting; the fifth is a portable type

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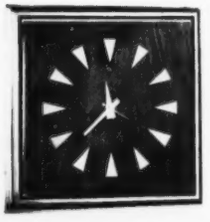
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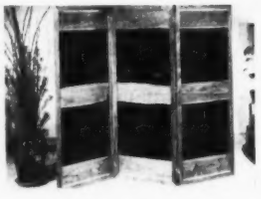
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with polished brass base. All clocks feature unusual designs and finishes, including *tortoise shell, wormy chestnut, leather* and *oil finish walnut.* One model has a built in planter with a removable liner, and is also available as a barometer. Further information is available.
AIA file no. 35-N-4

MFR: HOWARD MILLER CLOCK CO.
Circle 60 for further information

Wood folding door

MFR'S DESCRIPTION: the *Martin Door* is a custom manufactured, top-supported, accordion action, wood folding door.

USES: varied interior installations.

SPECS/FEATURES: designed for installation ease, unit consists of ¾" thick by 6" to 12" wide panels hinged by special fabric hinge. Top supported only, entire suspension assembly operates in 1¼" square 16 gauge steel channel. When door is fully extended, adjacent panels form 140° angles with each other to provide optimum bearing surfaces between panels. Large bearing surfaces, together with continuous hinging, afford unusual rigidity and resistance to bottom sway. Other advantages include: use of any available wood veneer in heights up to 12'; stacked depth as low as 8 per cent of total opening through use of 12" wide panels; low cost doors for tight budget projects, with panel surfaces prepared for painting. Doors are produced only on custom basis.
AIA file no. 16-M

MFR: LEGGET CO.
Circle 61 for further information

Folding room screens

MFR'S DESCRIPTION: Howard Miller Clock Co., introduces three folding room screens.

USES: interior applications in traditional or contemporary settings.

SPECS/FEATURES: screens available in unusual styles to conform with various settings. Style *No. 701:* tortoise shell foil in dull black frame; panels 84" high, 22" wide; retails at $99.50 per panel. Style *No. 702:* oil finished walnut frame with polished brass trim and black (or white) naugerhyde panels; panels 60" high, 24" wide; retails at $79.50 per panel. Style *No. 703:* oil finished walnut frame with washable bronze grasscloth and white enamel with polished brass medallions; panels 72" high, 20" wide; retails at $119.50 per panel. Number of panels in each screen can be varied. Style *No. 702* illustrated.
AIA file No. 28

MFR: HOWARD MILLER CLOCK CO.
Circle 62 for further information

SIGNAL SYSTEMS

Intercom systems

MFR'S DESCRIPTION: *Challenger Futura* line includes two compact, multiple-station intercom systems.

USES: multi-station applications.

SPECS/FEATURES: *Model CHM6* master station, for systems up to six stations, has volume control, press-to-talk button and seven-position selector, including "all" and "mute" positions. Unit can be used to call any other station, or all simultaneously. *Model CHM12* is similar but does not permit calling all stations simultaneously. Both units contain three stages of amplification plus selenium rectifier. Each measures 5¼" x 10½" x 4¾".
AIA file no. 31-i-51

MFR: BOGEN-PRESTO CO., DIV. THE SIEGLER CORP.
Circle 63 for further information

Vibratory signal horn

MFR'S DESCRIPTION: *Vibratone* is a flexible, vibratory horn of recent design, intended to simplify installation of emergency alarms and coded signal systems.

USES: public buildings, industrial plants and institutions.

SPECS/FEATURES: horn unit fits into 4" square electrical outlet box. Individual volume controls are provided. Sound can be adjusted from barely audible buzz to 101-103 decibels at 10'. Units are engineered for signal systems involving hours of continuous operation; even at high volume, horn has low current consumption. Three models available—grille type for offices, laboratories, etc.; single projector style where alarm must be megaphoned at longer range; and double projector when two-directional distribution is desired.
AIA file no. 31-i-39

MFR: FEDERAL SIGN AND SIGNAL CORP.
Circle 64 for further information

PLUMBING UNITS

Wall hung cooler

MFR'S DESCRIPTION: *Cordwall* is electric water cooler suitable for wall mounting without exposed brackets or plumbing.

USES: industrial, institutional, commercial and public buildings.

SPECS/FEATURES: unit can be mounted either flush to the wall, semi-recessed or recessed, in two step installation. Finished in neutral gray baked enamel with stainless steel top, *Cordwall* is 24" high, 15¾" wide and tapers in depth from 13" at top to 9" at bottom. Thirteen gallons per hour are provided. Built-in regulator allows uniform fluid flow regardless of water pressure between 20 and 100 psi.
AIA file no. 29-H-1

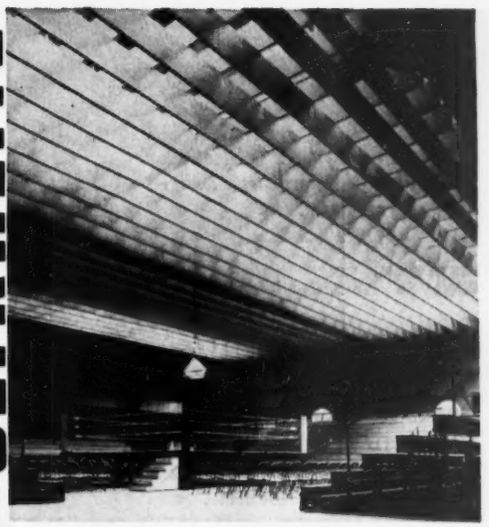
MFR: CORDLEY & HAYES
Circle 65 for further information

Thermostatic water mixer

MFR'S DESCRIPTION: a line of 25 Swiss thermostatic water mixers has been recently introduced in the U.S. by Simix Co.

USES: wide range of models and dimensions for homes, hotels, schools, hospitals, doctor's offices, beauty salons, barber shops, laboratories, etc.

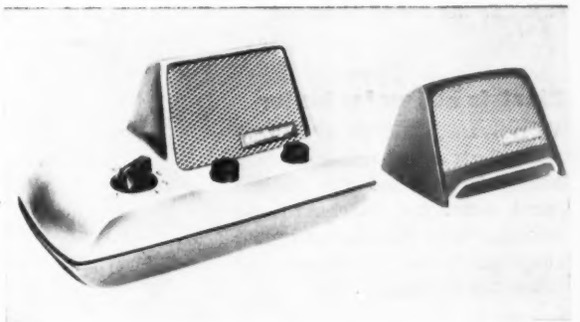
SPECS/FEATURES: made of stainless steel with high lustre finish, valves have individually controlled dial graduated in Fahrenheit degrees. Mfr reports valves make possible assurance of exact temperature selected and eliminate danger of scald-



Insulation baffles enhance gym acoustics

ULTRALITE, the insulation made exclusively of long, textile-type glass fibers, is being widely used as a sound baffling material in ceilings of auditoriums, stadia, arenas, field houses, etc. Typical is its use in Foster High School Gymnasium, Seattle, Wash. (Architect: Ralph Burkhard.) Long strips of ULTRALITE were hung in crisscross fashion to form an interesting and acoustically effective grid pattern for the ceiling. Openings between strips permit natural light to come through from translucent roof panels. Metal grips hold material to wires, are pulled taut with turnbuckles. For information on ULTRALITE'S many acoustical uses, write to **GUSTIN-BACON** Manufacturing Co., 250 W. 10th Street, Kansas City, Missouri.

Circle 10 for further information



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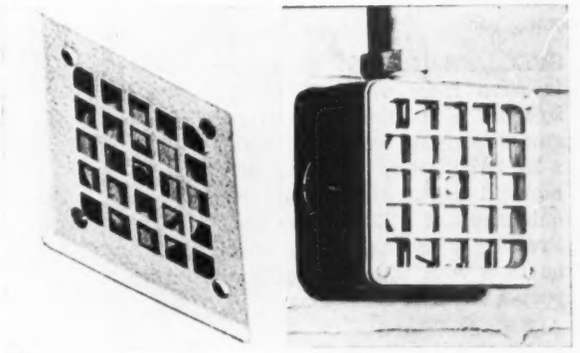

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ing. Added feature is lock for maximum temperature desired as safety feature.
AIA file no. 29-D-21

MFR: SIMIX CO
Circle 66 for further information

HVAC

Baseboard element cover

MFR'S DESCRIPTION: simulated wood-grain baseboard cover, known as *Acousti-Cover*.

USES: applications in wood-paneled living rooms, dens and recreation rooms.

SPECS/FEATURES: units are available in factory-cut, unbroken lengths from 2" to 20" for wall-to-wall installation, thereby eliminating need for mid-room splicing. Elements are available in various tube sizes with different industry-approved ratings: ½" and ¾" nominal tube sizes plus high-capacity units.

AIA file no. 30-C-44

MFR: EDWARDS ENGINEERING CORP.
Circle 67 for further information

Electric hot water boiler

MFR'S DESCRIPTION: *Precision*, electric hot water heating boiler, is designed for radiant panel, convector, baseboard and radiator type heating systems; adaptable to coal, oil, or gas-fired hot water systems.

USES: homes, motels, churches, commercial buildings and swimming pools.

SPECS/FEATURES: available in sizes from 40,948 BTU to 2,047,200 BTU. Former unit requires space 20" wide x 20" high x 36" long; latter, 60" wide x 70" high x 108" long. Units meet requirements of ASME Boiler and Pressure Vessel Code. Can also be used with water chiller for year-round air conditioning.

AIA file no. 29-D-2

MFR: PRECISION PARTS CORP.
Circle 68 for further information

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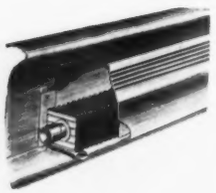

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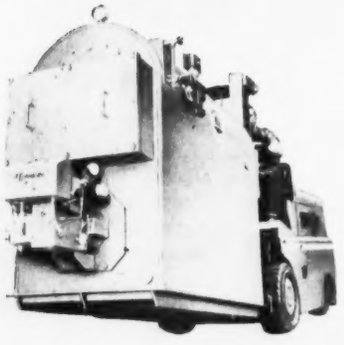

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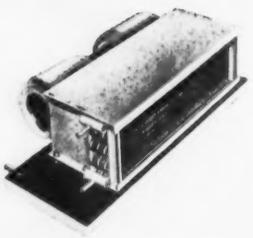

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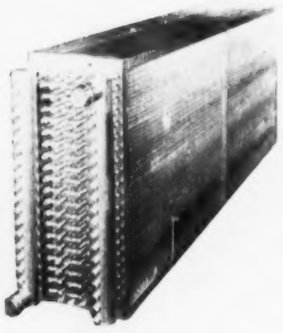

Forced-draft boiler

MFR'S DESCRIPTION: *Kewanee Square-Heat Type RF* units, packaged boilers, featuring forced-draft firing, are now available.

USES: commercial and industrial installations.

SPECS/FEATURES: packages cover range of SBI net ratings (steam) from 1,010 to 5,620 sf and (water) from 243 to 1,350 MBH. Burner fires natural, mixed or LP gas or No. 1 or No. 2 fuel oil or combination gas/oil. Among features emphasized is front-mounted control panel designed to provide selector switch for instant fuel change-over on combination gas/oil units. Additional technical data is available.
AIA file no. 30-C-1

MFR: AMERICAN-STANDARD INDUSTRIAL DIV.
Circle 69 for further information

Horizontal a/c unit

MFR'S DESCRIPTION: *Type 30 Remotaire*, year round horizontal fan-coil air conditioning unit, has been designed for use with hot or chilled water in such concealed overhead installations as dropped ceilings and closets.

USES: apartments, hotels and motels.

SPECS/FEATURES: unit permits removal of air conditioning equipment from exterior wall, freeing its design. Fan load and motor speed are matched for lower operating cost. Design eliminates metal-to-metal contact between pan and bottom of coil. Also assures clear draining and easy cleaning; no auxiliary drain pan is necessary.
AIA file no. 30-F-2

MFR: AMERICAN-STANDARD
Circle 70 for further information

Water-cooling coils

MFR'S DESCRIPTION: cleanable water coils have been introduced to a line of chilled water-cooling coils.

USES: central station or zone air conditioning systems.

SPECS/FEATURES: coils feature *Turbu-Flo* fin to provide extra measure of heat transfer capacity. Seamless copper tubing, ⅝" OD, is spaced on 1½" centers. Galvanized casings are standard. To simplify coil installation, flanges and mounting holes are provided. Coils available with finned surface heights ranging from 12" to 36", in 3" multiples. Lengths range from 24" to 120", in 6" multiples.
AIA file no. 30-F-5

MFR: HALSTEAD & MITCHELL
Circle 71 for further information

Replacement motor

MFR'S DESCRIPTION: General Electric Co. has announced the development of 5½" diameter, shaded-pole motor with adjustable mounting adapter.

USES: replacement fan motor for room air-conditioners and furnace blowers.

SPECS/FEATURES: according to mfr, present trend to thinner air-conditioning units has necessitated constant shortening of motor models to enable proper replacements to be made. Extra-long double shaft extensions with maximum-length flats are said to be standard on units. May be cut to intermediate lengths or to single-shaft requirements. Finish on shafts is said to protect against corrosion and provide for easy removal of fans and blowers. Motor is available in following shaded-pole ratings: 4-pole models from ⅛ hp through ¼ hp, 115 or 230 V: 6-pole models from 1/10 hp through 1/6 hp, 115 or 230 v.
AIA file no. 31-G-29

MFR: GENERAL ELECTRIC CO.
Circle 72 for further information

HVAC system

MFR'S DESCRIPTION: self-contained, individual room heating and ventilating system, including perimeter-type, draft-free, air distribution.

USES: schools and other areas with similar standards.

SPECS/FEATURES: system utilizes *Janitrol* counter flow gas-fired conditioner, enclosed in floor-to-ceiling metal cabinet. Includes wall duct sections, attached to exposed walls, which discharge conditioned air in draft-free vertical pattern. Automatically actuated fresh air modulating damper has been incorporated into system. Complete engineering and specification information file is offered.
AIA file no. 30

MFR: JANITROL HEATING AND AIR CONDITIONING DIV., SURFACE COMBUSTION CORP.
Circle 73 for further information

Prefab air chamber

MFR'S DESCRIPTION: *Tap/Trap* is one-piece, ready to use air chamber, installed directly into water system by single solder joint.

USES: absorb water shock and hammer normally encountered when faucet or valve is opened or closed.

SPECS/FEATURES: applicable to both new and old water systems, *Tap/Trap* is easily installed on top of all water risers and vertical fixture branches; uses air cushion to absorb shock and hammer. Units available in 6" and 12" lengths with a volume of 3.78 and 7.78 respectively. Longer lengths can be produced for special situations. Over-all diameter is 1", with one end reduced to ½" for installation in standard fittings.
AIA file no. 29-D-8

MFR: WOLVERINE TUBE DIV., CALUMET & HECLA, INC.
Circle 74 for further information

RESIDENTIAL USES

Refrigerators

MFR'S DESCRIPTION: Revco, Inc., offers five models in its built-in refrigeration line.

USES: residential refrigeration.

SPECS/FEATURES: 1959 models include: (1) *Gourmet Refrigerator*, Model RH-99, is 9 cu. ft. size. Spiral evaporator outside the food compartment chills the

VAN-PACKER
MODEL HT
SMOKESTACK is the ONLY INDUSTRIAL STACK listed by UNDERWRITERS' LABORATORIES

When your projects call for a smokestack, you can specify a Van-Packer Model HT Prefabricated Refractory Smokestack knowing that it lives up to the high standards required to earn an Underwriters' Laboratories listing.

The Van-Packer Model HT Smokestack for boilers, furnaces, and incinerators is the *only* UL listed stack. It is the same stack for industrial applications that is already serving hundreds of users throughout the nation with these advantages: low cost, prefabricated refractory construction, maintenance-free, high draft, stocked in eight diameters nationally.

Write for new Bulletin IS-40 for complete mechanical specifications and details on Underwriters' Laboratories listing

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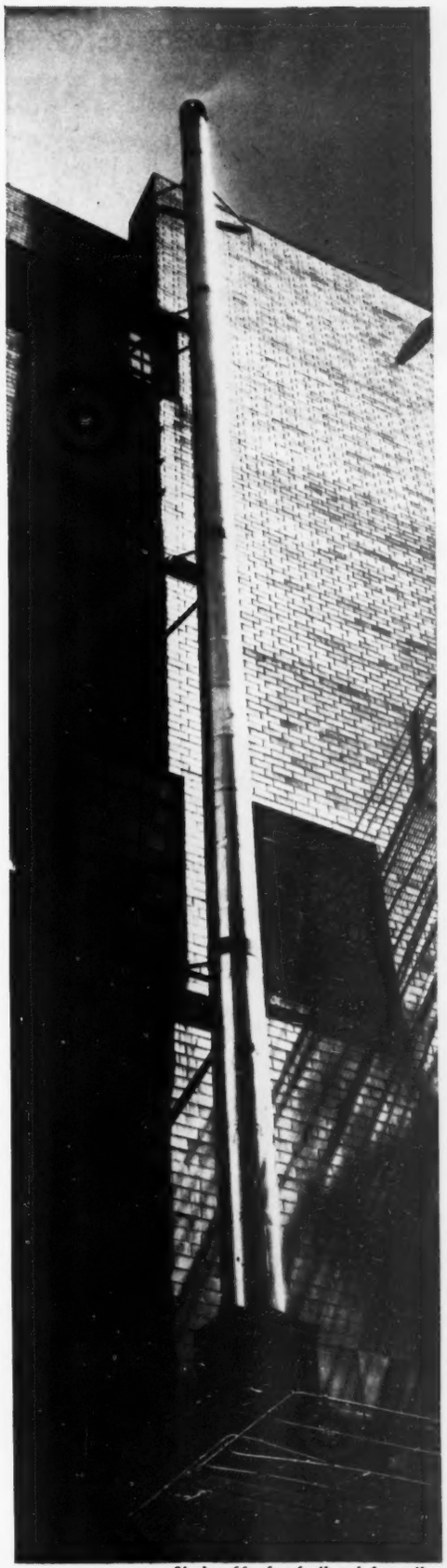
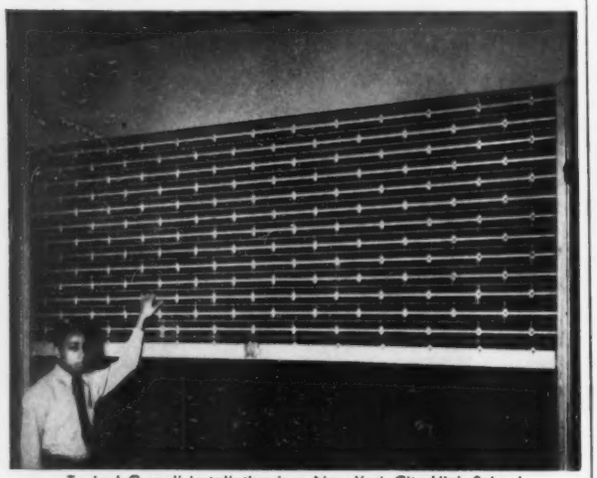


Circle 11 for further information

Designing a school?... Remember

ROLLING METAL GRILLES

by CORNELL

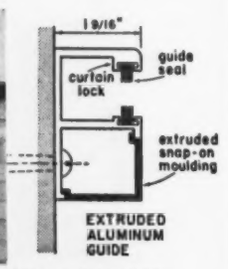


Typical Cornell installation in a New York City High School

Light and airy as a butterfly in appearance

...yet they give "ROLLING STEEL DOOR" protection

Cornell Rolling Metal Grilles offer a safe and attractive way to close off school corridors without blocking light, air or vision. Cannot pinch fingers. Available in galvanized or stainless steel, bronze, and in silvery satin or color-anodized aluminum, in graceful and exclusive Cornell "Butterfly" design. Rolls up out of sight into a coil box which can be concealed in ceiling. Progressively improved since 1931 when first introduced by Cornell. Specified by leading architects for America's finest schools.



CORNELL 1¼" FLATSLAT ROLLING SHUTTER

With concealed hardware and flat, gleaming surfaces, easily kept clean. Dustproof, rattleproof. Aluminum, anodized satin finish, or bronze, stainless or galvanized steel. Also available as a packaged unit, factory assembled in a stainless steel frame with sill.

SEE OUR CATALOG IN SWEET'S

CORNELL IRON WORKS, INC.

Established 1828

36th Ave. and 13th St., Long Island City 6, N.Y.

Representatives in all Principal Cities

Circle 12 for further information

products, equipment, materials

air which circulates, exposed to ultra-violet rays for reduction of odor transfer and spoilage, around food compartment. (2) *Icemaker Refrigerator,* Model RI-89, is 7 cu. ft. Reported capable of being used with the *Gourmet* to provide a total of 16.3 cu. ft. for fresh and frozen food storage. Mfr emphasizes automatic push button defrosting. (3) *Custom Freezer,* Model FG-79, provides 5.7 cu. ft. of frozen storage, according to mfr. Has adjustable control from 0° to 20° below zero. Features shucker trays and ice cube container; automatic ice tray filler is optional. (4) *Undercounter Freezer,* Model FU-69, is designed with side vents and special frame to install under standard kitchen counters. (5) *Undercounter Refrigerator,* Model RU-59, is designed for installation under counters for secondary refrigeration in kitchen, recreation room, bars, offices or for patio service.

MFR: REVCO, INC.

Circle 75 for further information

Ironing cabinet

MFR'S DESCRIPTION: Iron-A-Way Co. has marketed a self-contained pressing and ironing cabinet for clothes and laundry.

USES: motels, hotels, laundries, hospitals, dormitories, apartment buildings and related applications.

SPECS/FEATURES: unit is available as a free or coin-operated service. Cabinet contains a steel perforated fold-down, silicone-covered ironing board and GE iron, both operated with an automatic timing mechanism, according to mfr. Lack of need for special wiring and installation ease by hanging or recessing in wall are features stressed. Units available with wood finishes, mirrored or without mirror.

AIA file no. 35-D-2

MFR: IRON-A-WAY CO.

Circle 76 for further information

DOORS/HARDWARE

Aluminum door package

MFR'S DESCRIPTION: standard aluminum faced, honeycomb door package is now available.

USES: residential installations.

SPECS/FEATURES: available in four weatherstripped types, in six sizes. Models include flush solid panel, large upper opening, three vertically placed lights and bottom fixed louver types; all types include complete line of standard hardware. Features include roll-interlocking beveled edge which imparts exceptional perimeter strength and provides smooth finished appearance, springlocking cutout casements and reinforcing spine which slides into extruded edge. Exposer screws and facing seams have been eliminated. Facings are hardboard-backed for impact resistance.

AIA file no. 16-A

MFR: PANELFAB PRODUCTS, INC.

Circle 77 for further information

Chain door lock

MFR'S DESCRIPTION: *Dorguard,* chain door lock, incorporates recently developed feature.

USES: residential installations.

SPECS / FEATURES: recent idea, incorporated in product, enables chain on door's inside to be released by key from the outside. When door is closed, five pin tumbler cylinder provides security and protection for inhabitants. Key, from outside, rotates slotted plate inside and ejects locking pin from slot.

AIA file no. 27-B

MFR: LOCKWOOD HARDWARE MFG. CO.

Circle 78 for further information

Aluminum door

MFR'S DESCRIPTION: *Olympia* is pre-hung aluminum screen and insulating door, said to be easy to install.

USES: residential budget item.

SPECS/FEATURES: door features include self-adjusting "air-draulic" door closer, which automatically compensates for difference in weight between glass and screen inserts, adjustable sill expander and full length piano hinge with pile weatherstripping.

AIA file no. 16-A

MFR: CAPITOL PRODUCTS CORP.

Circle 79 for further information

Hollow metal door

MFR'S DESCRIPTION: seamless hollow metal door, utilizing honeycomb construction, is reported to combine rugged dimensional stability of steel and structural strength of honeycomb material.

USES: commercial, institutional and industrial applications.

SPECS/FEATURES: tests show this type of reinforcement is stronger than previous doors of steel channel reinforcement type. Both wet and dry honeycomb resisted shear tests up to 1,575 lbs before failure of lamination. Available in variety of sizes and types, in various finishes.

AIA file no. 16-A

MFR: STEELCRAFT MFG. CO.

Circle 80 for further information

Pivot reinforced hinge

MFR'S DESCRIPTION: pivot reinforced hinge, combining pivot and ball-bearing butt hinge in one interlocked unit, sharing same pin to assure perfect alignment, has been introduced.

USES: reinforcement for doors and frames subject to heavy abuse.

SPECS/FEATURES: once assembled, pivot leaves of hinge cannot shift in any direction unless hinge barrel and leaves also move in same direction. Door can be easily removed by extracting pin. Available in bronze or steel.

AIA file no. 27-B

MFR: STANLEY HARDWARE DIV., THE STANLEY WORKS

Circle 81 for further information

THE ANATOMY OF A NEW PROJECT

preview: 8

531 EAST 88 STREET, NEW YORK, N. Y. | *project*
W.B.N. DEVELOPMENT CORPORATION | *client*
GIORGIO CAVAGLIERI, AIA | *architect*
A. D. ATESHOGLOU, PE | *structural engineer*
DR. NICOLA GINZBURG, PE | *mechanical/electrical engineer*

Program factors

New York City's Borough of Manhattan presents unusual contrasts in housing conditions. Of the new construction that has been developed in the past decade, the vast majority of the projects have either been low-income, publicly supported slum-clearance projects or expensive, luxury apartments on Gotham's fashionable east side. There has been relatively little, so-called, "middle-income" housing developed within Manhattan proper. Ownership of one's own home has been limited to the greater suburban Metropolitan areas of Long Island, Westchester, Connecticut and northern New Jersey.

In recent years, co-operative ownership of apartment units has rapidly come into being as a means of acquiring posession of one's place of residence. This has contributed to a continuity in living pattern and neighborhood stability. This means of "home" ownership has been a boon to those hardy individuals and their families who prefer the stimulus of the metropolis to the benign calm of the suburb. As a result of the popularity of co-operative programs, one sees any number of apartments offered on this managerial basis in the new high-rise buildings of 19 stories or more.

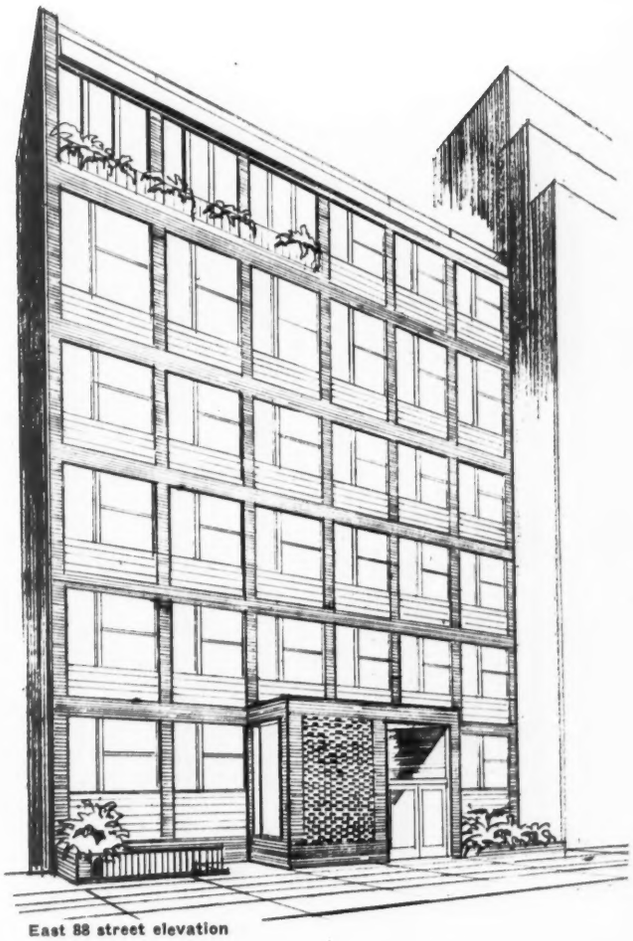
In order to acquire sites for these new buildings, many of Manhattan's sedate, brownstone townhouses have been demolished to make way for the new structures. To many a New Yorker, this is a lamentable fact for two reasons: first, it means the removal of buildings which provide a more intimate scale and style of living, and second, it has created a depletion in the housing market for those desiring this type of residence which in the past has provided a more personable character to city streets. For those who have been able and fortunate in being able to acquire a brownstone as a townhouse, it has invariably been very costly. Prices range from $80,000 to $100,000. Obviously, at this scale, it would preclude a significant range of "better-than-average" income levels.

One answer seems to lie in the acquisition of several old brownstone units under one management title and develop them as a co-operative venture of several resident-owners. The old units are remodeled and converted into individually-designed units according to the personal tastes of their individual owners.

The East 88 Street project

The project given here is located on the east side of Manhattan in the historic Gracie Square district. This project represents a program wherein twelve owners co-operatively

(*Continued next page*)



East 88 street elevation

have created such a "townhouse" scale in their housing by combining and remodeling two brownstones.

Among the advantages for the new owners are those of the personal innovations in the planning and detailing of design not offered to the large apartment house "co-op" owner. Another factor is perhaps in the realm of the psychological: a "physic dividend," if you will, of the sense of individuality and the lack of pretention in character so common to many of the large, apartment buildings. The brownstone owners consider their project a more gracious, yet contemporaneous mode of living in a community dominated by so many large buildings.

Some general features

The street elevation is a grid of light-colored brick with the window spandrel voids below the windows of gray-colored, plastic-painted block, recessed from the brick grid. Every second brick course receives a *Dur-O-Wall®* reinforcing tie. Oak strip flooring is provided in apartments whereas common corridors are vinyl-tiled surfaced. The window sash is wood with one fixed light and a double-hung unit. A one and one-half slate sill is used with the wood sash.

The entrance vestibule features a pierced brick wall at the street. Interior walls of the vestibule are to be finished in 12" x 12" x ½" Vermont marble tile. The finished floor is terrazo.

Structural notes

One structural innovation, which complies with the New York multiple dwelling law, was in the use of the existing ground level floor framing as a new slab form. Steel beams were dropped between the wood joists and the reinforced concrete slab then poured. Upon setting, the existing wood flooring and wood joists were stripped leaving the new slab and steel framing. This method provided a "reversed" concrete job without the expense of formwork. This innovation represented a significant economy in the remodeling and complied with the fire-rating regulations of the building code.

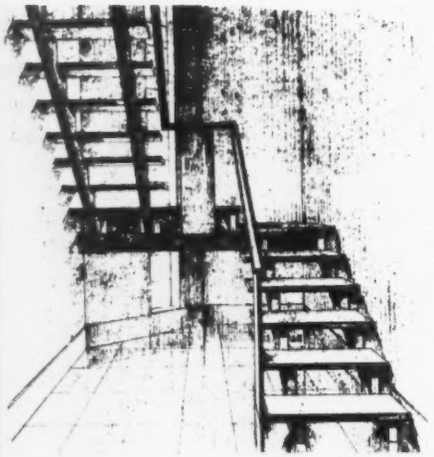
Another innovation was in the sawing off at the bearing walls, the wood framing of the former pitched roof and dropping it as a unit into previously prepared shelf angles to create a new level floor.

Mechanical and electrical notes

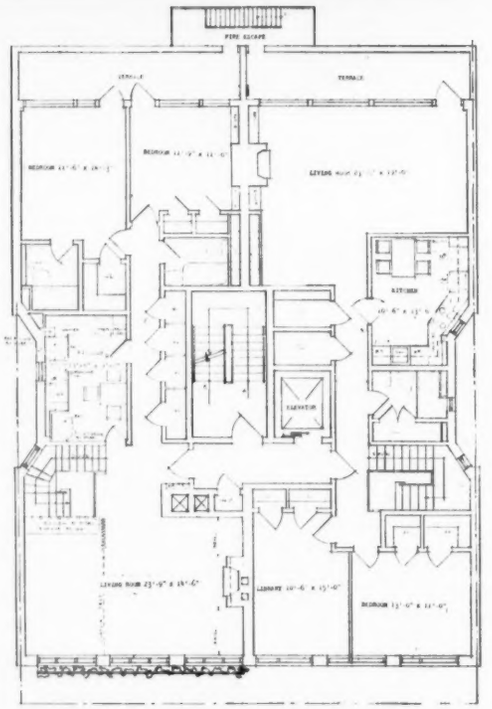
Heating by two-pipe hot water system with convector fin tube. The convectors and the air conditioning units are covered by means of custom-built enclosure which will unify their appearance at the window wall of the room. The construction contract provides for a self-service elevator, room air-conditioning outlets, TV outlets, inter-com telephone outlets, and electrical fixtures.

Area and costs

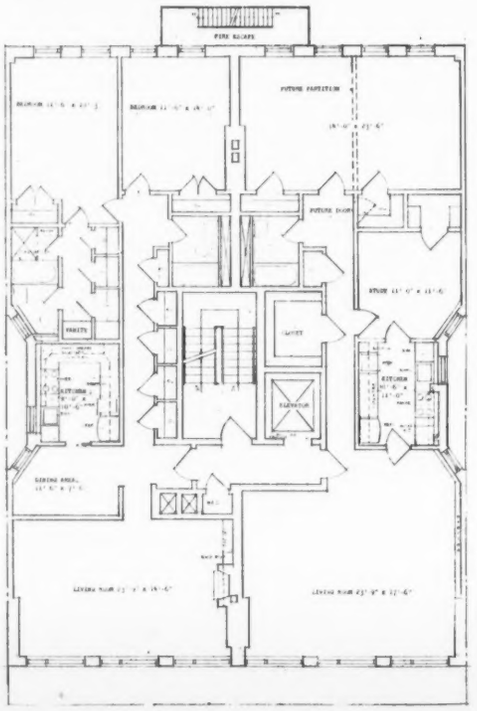
Approximate total area of the building including the basement is 26,000 square feet. If one applies the Turner Construction Index for New York City adjusted to 1959 at $12.10/sf, the estimated cost of the total contract would be $314,600.00.



Architect's study of interior connecting stairs of east duplex penthouse.



Plan of upper penthouse level (above) shows individual owner planning variations. Apartment at left has two bedrooms at rear with living area in front capable of sub-division. Apartment at right provides living room at rear with fireplace and library and bedroom at front of building. Each of these apartments connects with own interior stair to lower professional office level of same duplex. Third and fourth floor plan (below) shows planning differences desired by each owner.



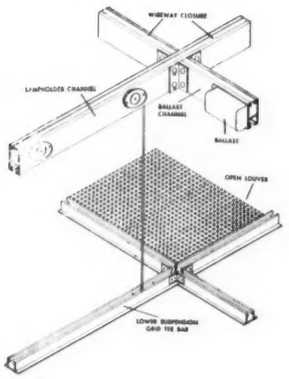
literature

Literature cited in this department is available from various manufacturers and associations free of charge. To obtain copies, circle the keyed numbers on the reader service cards facing pages 8 and 32.

Luminous ceilings

Ceilings Inclusive treats of the increasing prominence attributed to illumination as a basic architectural factor. Catalog intended as reference index to architectural and engineering details which apply to luminous ceilings. Included are diagrams and charts providing information on fixture features and footcandle levels. Complete section drawings and specifications describe numerous ceiling units available. Included are sections on fluorescent strips, lower suspension systems, diffusion, acoustics and partitioning, structural attachments and three diffuser elements designed by Douglas Baker. All details indicated are available as full scale drawings or as part of composite drawing of a complete ceiling.
AIA file no. 31-F-2.

MFR: ARCHITECTURAL CEILINGS, INC.
Circle 85

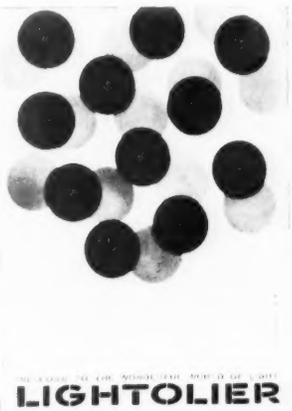


85

Lighting style book

Welcome to the Wonderful World of Light, comprehensive style book for residential lighting, contains more than 500 separate items—200, being presented for the first time. Mfr designates book, "a portable showroom," planned to give architects a complete guide to recent design concepts. Included are color illustrations, line drawings, solutions to lighting problems, decorating ideas, lamps and recessed and decorative fluorescent and incandescent fixtures for both interior and exterior home lighting. (96 pp.)
AIA file no. 31-F-23

MFR: LIGHTOLIER, INC.
Circle 86

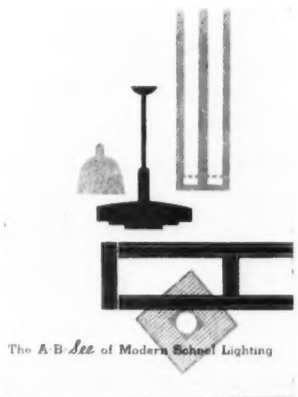


86

School lighting booklet

The A-B-See of Modern School Lighting presents an explanation of factors and problems involved in lighting school areas. Amount and quality of light needed to perform various tasks is explained, and discussions on both artificial and natural light are contained. Booklet gives illustrations of various types of lighting fixtures with performance chart. Written by Bill F. Jones, research engineer, with the assistance of the Illuminating Engineering Society and the State of California Bureau of School Planning, booklet treats: classroom lighting; and lighting school areas other than classrooms. Comparison chart of ten types of lighting fixtures is given. (24 pp.)
AIA file no. 31-F

MFR: SMOOT-HOLMAN CO.
Circle 87



87

Plastics evaluation

Comparison of outstanding properties and typical industrial applications of 13 major plastic families in common industrial use is the subject of *Facts About Plastics.* Information is presented on acrylic, *Implex,* nylon, *Teflon,* polyethylene, flexible and rigid vinyl, cellulose acetate, butyrate, polystyrene, high and medium impact styrene, phenolic and fibrous glass reinforced polyesters and epoxies. Basic descriptive information contradicts some commonly-held misconceptions about plastics. (4 pp.)
AIA file no. 24

MFR: CADILLAC PLASTIC & CHEMICAL CO.
Circle 88

Roof manual

Architects' and engineers' reference manual for 1959 has been released, as planning aid for proper type of roof to meet the requirements of almost any situation. Revised edition contains simplified format, and repetitions have been eliminated. Specifications, methods and procedures are presented for built-up roofs, roof insulation, flashings, roof drainage systems, waterproofing and dampproofing. Fiberboard products, asphalt shingles and glass reinforced translucent panels are also included. Mfr states availability of his technical service for non-obligatory consultation. (68 pp.)
AIA file no. 12-B

MFR: BARRET DIV., ALLIED CHEMICAL CORP.
Circle 89

Aluminum foil uses

Alcoa Industrial Aluminum Foil booklet states as its objective, aiding the development and improvement of products and uses of aluminum foil. Cover is printed on foil in four colors, and the contents indicate numerous uses for this thin metal in architectural, electrical, heating, cooling and other applications. Potential uses for foil are also included. Information on tensile strength, elongation, electrical conductivity, reflectivity, surface, etc., are provided in graphs. Additional technical data is available. (26 pp.)
AIA file no. 15-J

MFR: ALUMINUM CO. OF AMERICA
Circle 90

Glass/glazing

Brochure describing properties of various glass products for window installations, is now available. Included is data on *Lustraglass,* in single and double strength for conventional glazing, *Lustracrystal,* heavy sheet glass for large openings, *Lustragray* and *Lustrakool* for glazing where glare and heat reduction is required, and *Lustrawhite,* picture glass, said to have exceptional clarity and flatness. Data included on features, dimensions, solar radiation transmission, grading and recommended applications. Ordering and specifying instructions are also included. (4 pp.)
AIA file no. 26-A

MFR: AMERICAN WINDOW GLASS CO.
Circle 91

Building panel manual

Panelfab Houses and Buildings, describes a variety of modular panels

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Company_____
Address_____

Circle 13 for further information

literature

and finishes, panel construction, types, uses, typical plans, site preparation and erection. According to mfr, *Panelfab* construction method utilizes load bearing wall and roof sections without structural framework. Sections are joined through patented interlocking joints without nuts, bolts, screws or other projecting fasteners. Panel core is phenolic impregnated kraft-paper honeycomb with aluminum facings laminated with phenolic resins under heat and pressure. Sections are said to provide extreme strength in relation to weight, are fire resistant and offer highly effective insulation. Salient feature of system is light weight. (38 pp.)
AIA file no. 17-A

MFR: PANELFAB PRODUCTS, INC.
Circle 92

Plywood components

Plywood Fabricator Service, Inc., an affiliate of Douglas Fir Plywood Assn., has released a file folder covering plywood components for home building, light construction and industry. Booklet treats briefly of component construction as a technique, and proceeds to descriptions of fir plywood box beams, curved panels, stressed skin panels, trusses and pallets. Also stresses advantages, such as reduced costs, uniform manufacture, modular construction, precision fit, design freedom and attractive appearance. Included also in folder are separate specification sheets for each unit. (10 pp.)
AIA file no. 19-F

ASSN: PLYWOOD FABRICATOR SERVICE, INC.
Circle 93

Standards index

The 1959 price list and index of American Standards is now available. Publication lists more than 1,800 standards approved by the American Standards Assn. Among fields covered are civil engineering and construction, commercial standards, drawings, symbols and abbreviations, electrical engineering, ferrous materials and metallurgy, mechanical engineering, pulp and paper industry, rubber, textile industry, wood industry, industrial safety, highway safety and consumer goods. Also included are international standards recommendations published by the International Organization for Standardization and International Electrotechnical Commission.
AIA file no. 40-B-4

ASSN: AMERICAN STANDARDS ASSN.
Circle 94

Revised filing system

Economic and time saving advantages of a scientific records management program are stressed in recent brochure. Included is study showing that approximately 70 per cent of records in the average file have outlived their active usefulness, yet are retained in active file. Study suggests records held by average organization can be reduced to four classifications: (1) retained permanently; (2) retained for current needs; (3) destroyed; and (4) transferred. Figures are included to illustrate how a firm can measure its own filing costs and efficiency. Brochure contains four tests for self-administration, to enable a firm to determine its needs for a records management system. (4 pp.)
AIA file no. 35-H-4

MFR: REMINGTON RAND, DIV. OF SPERRY RAND CORP.
Circle 95

Floor specifications aid

Booklet offering concise specifications for every major type of resilient flooring is now available to architects and other specifiers. *Basic Guide Specifications* is intended to be a time-saving innovation in field of writing construction specifications. Each specification is presented in its own perforated section, enabling specifications writer to tear off the description and present it for verbatim copying. Since each specification is repeated several times, booklet can be used for multiple jobs. Comprehensive specifications are still available from mfr; present booklet is designed simply for convenience and flexibility.
AIA file no. 23-G

MFR: ARMSTRONG CORK CO.
Circle 96

Pre-amp equipment

Portable preamplifier, designed for public address systems, is described in technical sheet recently released. Four models available, and mfr claims low noise level, excellent frequency response and provisions for microphone plug-in transformers as features. Also stated to be capable of driving up to 150 program amplifiers. Complete description and architects' and engineers' specifications are included. (single sheet)
AIA file no. 31-i-7

MFR: DUKANE
Circle 97

Compact motor

Bulletin with technical data insert discusses features and basic advantages of General Electric *Unitized* motors. Versatility, efficiency, new bearings and insulation system of motors are described in illustrated bulletin. Technical bulletin gives construction features, electrical performance, mechanical variations and dimensions of the four-pole, 59-frame, shaded-pole and permanent-split capacitor motors. Also lists advantages and applications for units in ratings from 1 millihorsepower through 1/15 horsepower. (12 pp.)
AIA file no. 31-G-2

MFR: GENERAL ELECTRIC CO.
Circle 98

Gravel stops

Aluminum copings and gravel stops, designed to permit crisp architectural lines, be economical, durable, maintenance-free and non-staining, are detailed in recent AIA file folder. Folder contains complete cross-section drawings, installation details and specifications, and are printed on slip sheets to facilitate use by architects and engineers in direct tracing, study and reproduction. Additional sheet contains suggested specifications and numerical index of extrusions used in systems. (9 sheets)
AIA file no. 12-C-3

MFR: REYNOLDS METALS CO.
Circle 99

Bonding/coating

Bulletins A 4195 and A 5195 describe *Block-Fast*, fast-setting, heavy-bodied liquid bond for industrial wood and asphalt block, and *Black-Top-Tred*, designed for treatment and preservation of black-top and concrete parking lots and drive surfaces. *Block-Fast* is reputed to cushion blocks and provide a firm, non-brittle base for faster and easier installation. Mfr claims obnoxious fumes and fire hazards have been eliminated. *Black-Top-Tred* is reported as heavy-bodied liquid emulsion with adhesive and waterproofing qualities. Here too, absence of heat

and fumes is significant. Bulletins are comprehensive in coverage; contain such pertinent information as advantages, packaging, uses, suggestions for preparation and application, limitations of products and anticipated areas of coverage. (each 2 pp.)
AIA file no. 7-B-2
MFR: ROCK-TRED CORP.
Circle 100

Weatherstripping guide

Reference guide and catalog for 1959, on weatherstripping materials and approved installation methods, is now available. Contains information on all types of weatherstripping for institutions, commercial buildings and homes, together with comprehensive suggestions for writing specifications on weatherstripping in building plans. Design and installation detail illustrations throughout the book are full size, wherever practical, to simplify architect's use of diagram material, with easier visualization of material and its incorporation directly into plans with minimum of scaling. Problem of adequate closure of doors equipped with floor hinges is treated, and an original saddle installation solution is described. Mfr states solution has proved satisfactory in test installations. (24 pp.)
AIA file no. 35-P-6
MFR: ZERO WEATHER STRIPPING CO., INC.
Circle 101

Concrete testing

Soiltest, Inc., has published a folder describing three basic tests for concrete quality control. Photographs of testing procedures and equipment show successful performance of the slump test, air entrainment determination and testing of concrete cylinders. Similar testing materials are also illustrated. (6 pp.)
AIA file no. 4-A-1
MFR: SOILTEST, INC.
Circle 102

Non-destructive testing

Current bulletin describes *Sonometer*, testing device which utilizes induced sonic vibrations for non-destructive testing of solid materials. Unit is said to induce continuous sonic vibrations into samples of concrete, plastic, carbon, metal and similar materials, and permits comparison of initially induced vibrations and vibrations transmitted through the sample. Mfr states apparatus can be used to measure transverse and torsional resonant frequencies and strengths and to determine Young's Modulus of Elasticity. In addition to feature information, bulletin contains illustrations, diagram of a typical application and examples of manner of performing tests. (2 pp.)
AIA file no. 31-E-5
MFR: SOILTEST, INC.
Circle 103

STRUCTURES

School structures

Design packet consisting of six typical roof truss and trussed rafter designs adaptable to school construction, is now available to architects and engineers. Designs are intended to assist architects in utilizing the advantages of economical clear span framing in one-story school construction. Packet includes designs for saw tooth, cantilevered and conventional pitched trussed rafters with spans ranging from 20′ to 50′. Stress diagrams, as well as complete lumber and hardware requirements, are shown on each design. Mfr emphasizes suitability of *Teco* designs to one-story school construction and adaptability of designs to specific requirements. (6 designs)
AIA file no. 19-B-3
MFR: TIMBER ENGINEERING CO.
Circle 104

Prestressed cylinder piles

Cylinder piles of prestressed concrete are featured in recent pamphlet. Recent installations of units are mentioned and photographs provided. Other sections detail manufacturing facilities and procedures, assembly and transportation, installation methods, proven designs, suggested designs, construction methods and test results. Charts are presented on design properties and standard sizes. Further technical information is available. (26 pp.)
AIA file no. 4-E-12
MFR: RAYMOND INTERNATIONAL, INC.
Circle 105

High-strength rivet

Illustrated, two-color brochure describes *Conical Keystone Lock (CKL)* blind rivets for high-strength structural fastening. Brochure is revised to include the latest in strength and material specification data, describes the *CKL* blind rivets, outlines their out-

Interior ladder access to the roof, on single-story as well as multiple-story buildings, adds up to convenience and safety your clients will appreciate. BILCO scuttles help you to achieve those "clean" building lines, lock securely, give only authorized personnel an easy route to and from the roof in all kinds of weather.

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Circle 14 for further information

literature

standing features and presents photographs which illustrate typical applications. Drawings are used to explain the driving cycle (installation sequence) of the lock-spindel blind fastener. Complete dimensional information is given in tabular form for full *CKL* line, including both standard and 1/64" oversize diameter blind rivets. Suggestions and recommendations regarding hole preparation, inspection and grip-range determination are also included. (16 pp.)
AIA file no. 13-C-1
MFR: HUCK MFG. CO.
Circle 106

Precast uses

Brochure describes how precast concrete floor and roof units provide fire safety and electrical flexibility in Columbus, Ohio's Port Columbus Airport Terminal. Numerous section drawings and photographs show how separate sets of hollow cells in concrete slabs were used in raceways for three complete underfloor signal, electrical and telephone systems.
AIA file no. 4-K
MFR: THE FLEXICORE CO., INC.
Circle 107

Horizontal shoring

Pecco horizontal shoring, consisting of a lattice section and a plate section, designed on the telescopic principle, is treated in recent, technical bulletin. Load tables, spacing chart and section drawings are given, together with photographs of actual installations and installation processes. Mfr claims lightweight and ability to expand as outstanding features of beams. (8 pp.)
AIA file no. 2-A
MFR: AMERICAN PECCO CORP.
Circle 108

Lightweight members

Fast, economical building construction through the use of lightweight steel structurals is the theme of *J&L Lightweight Structurals. Junior Beams, Junior Channels,* joists and light beam sections are treated in the literature, and application and erection techniques are included for such structures as apartments, office buildings, homes, schools and commercial and industrial buildings. Mfr claims units are flexible, making them suitable for mobile homes, stair stringers, supports and roof purlins in grandstands, and support for boatdeck plating. Tabular presentation covers specifications for design properties and dimensional details of each unit. (16 pp.)
AIA file no. 13-G
MFR: JONES & LAUGHLIN STEEL CORP.
Circle 109

Concrete folder

File folder containing series of booklets describing reinforced concrete pipe and accessories, is now available. Described are such products as *Hi-Hed* and *Lo-Hed,* pipe with elliptical shape for installation in areas where normal depth or width of trench is not feasible. *Flat-Base* pipe, *Amwate* pipe ballast, *Amram* jacking controls, *Massey* reinforced cribbing, *Amdek* concrete bridges and *Amseal* joint rings are each the subject of separate booklets. Construction and design features, methods of installation and descriptive photographs are included throughout. (10 booklets)
AIA file no. 29-B-6
MFR: CONCRETE PRODUCTS DIV., AMERICAN-MARIETTA CO.
Circle 110

Concrete admixture

Pozzolith, concrete improving admixture, said to maintain low water content, is shown in applications in 25 dams in the U. S., Japan, Canada, Alaska and South America. Booklet of case studies includes documentary support from chemists, engineers and contractors, and numerous photographs of *Pozzolith* in use on site. (48 pp.)
AIA file no. 3-B-2
MFR: MASTER BUILDERS CO.
Circle 111

HVAC

Hydrostatic shock control

Current bulletin describes causes and effects of hydrostatic shock and lists information on line of *Hydro-Trols,* designed to control shock and eliminate water hammer on any hot or cold water piping system. Sizing system, based on total fixture unit rating for each fixture, is included to determine what size unit should be installed on each piping run. (4 pp.)
AIA file no. 29-D-8
MFR: JAY R. SMITH MFG. CO.
Circle 112

Air purifiers

Connor Engineering Corp. has released Bulletin 108A, describing and illustrating "Dorex" activated carbon air purification equipment. Data on equipment selection, installation and application is provided, with discussion of activated carbon and how to achieve conditions generally necessary for proper purification. Equipment is guaranteed by mfr to absorb 95 per cent of present impurities. (12 pp.)
AIA file no. 30-D-3
MFR: CONNOR ENGINEERING CORP.
Circle 113

Duct fans

A line of belt-drive duct fans with adjustable driver sheaves to permit facile adjustment of fan speed is the subject of current literature of the Hartzell Propeller Fan Co. In addition to photographs of fans, ranging in sizes from 12" to 60", booklet contains dimensions, performance data and construction details on direct-drive duct fans in the same size range. (12 pp.)
AIA file no. 30-D-1
MFR: HARTZELL PROPELLER FAN CO.
Circle 114

Industrial air-conditioners

Catalog No. 570 describes complete line of *Model PAC,* packaged air-conditioners. Units are reported to be complete air-conditioning system, in one package, produced in models ranging from 20 to 60 tons. Mfr emphasizes positioning of all controls and maintenance points on one side. Construction details, dimensions, model designations, cooling capacities and compressor motor horsepower are included. (8 pp.)
AIA file no. 30-F-2
MFR: ACME INDUSTRIES, INC.
Circle 115

Damper/louver catalog

Dampers, louvers and shutters for general construction, heating, ventilating and air conditioning are illustrated in a current catalog. Among items pictured are extruded aluminum, steel, galvanized or copper louvers, fire dampers, automatic dampers, ceiling and wall shutters, counterbalanced shutters, gravity or electric shutters and door louvers. Models are available with either oilite bearings or ball bearings.
AIA file no. 30-J
MFR: ARROW LOUVER & DAMPER CORP.
Circle 116

Curtain wall systems

Recent pamphlet offers curtain wall system with self-contained air-conditioning and heating units, for motels and similar applications. Mfr says system affords such advantages as increased floor space, reduced building weight for lower foundation and framework costs, installation ease and lower operating costs. *Lupton Comfort-Conditioning* units are available for both average and heavy cooling loads. (4 pp. with insert)
AIA file no. 17-A; 30-F-2
MFR: MICHAEL FLYNN MFG. CO.
Circle 117

DOORS/WINDOWS

Special-duty doors

Standard and special types of roof scuttles, ceiling access doors, interior/exterior doors, basement doors and stair stringers are pictured and described in topical publication. Literature cites advantages and features of all units and comprehensive photographs supplement claims. (12 pp.)
AIA file no. 12-P
MFR: THE BILCO CO.
Circle 118

Aluminum windows

Sealair aluminum windows, of the projected, casement, classroom, top-hinged and pivoted types, are said to be completely redesigned, in current brochure. Mfr emphasizes windows are of quality caliber, offered at competitive prices. Unit features, detail drawings and dimension data are presented in brochure, together with glass size charts and specifications. Mfr lists double weatherseals, suitability for wet or dry glazing. (14 pp.)
AIA file no. 16-E
MFR: KAWNEER CO.
Circle 119

Door/window details

Detail sheets for drawing boards, covering single acting pivoted doors, center pivoted doors and fixed light construction in the *40 Line,* are offered by Cupples Door and Frame Corp. Details, in both quarter size and full size drawings, are printed on a semi-opaque paper of tracing quality so that prints may be made noting any special modifications by the architect. Quarter size details are on 8½" x 11" sheets punched for a standard three

ring binder to facilitate filing. (6 sheets)

MFR: CUPPLES DOOR AND FRAME CORP.
Circle 120

Rolling aluminum window

Colored brochure detailing construction features of the *Penguin* rolling aluminum window is now available. Major engineering aspects have been included in simple, non-technical illustrations. Built-in features, claimed to be unique, such as three-position, prowler-proof ventilation, double glazing, specially engineered weather stripping and rugged construction are fully described.
AIA file no. 16-E

MFR: PETERSON WINDOW CORP.
Circle 121

Sliding glass doors

Combo series, sliding glass doors, are described in a recent bulletin. Mfr claims doors combine desirable properties of steel and aluminum; steel is used for the frame, extruded aluminum for sliding vents and fixed lights. (4 pp.)
AIA file no. 16-N

MFR: STEELBILT, INC.
Circle 122

Architectural doors

Weldwood doors for residential, institutional, commercial and public buildings, are featured in current literature. Complete line of doors is pictured, as well as assorted finishes and cores. Section drawings and charts cite such information as dimensions, heat and sound transmission data and hardware installations. Specifications for fire doors, institutional doors, lumber core doors, hollow core doors, etc., are included. (12 pp.)
AIA file no. 19-E-1

MFR: UNITED STATES PLYWOOD CORP.
Circle 123

Windows/screens guidebook

Full line of steel windows and screens for commercial, school, institutional and residential structures is contained in topical brochure. Intermediate, architecturally projected, industrial and residential casement windows are included, with detail drawings and descriptions of construction and installation of units. Tables and diagrams are presented. (48 pp.)
AIA file no. 16-E

MFR: CECO STEEL PRODUCTS CORP.
Circle 124

Rolling doors/grilles/shutters

Illustrated booklet describes galvanized steel, aluminum, stainless steel and bronze rolling doors, grilles and shutters. Recommended uses, general unit descriptions and methods of operation are explained, and section drawings are provided which afford dimensional information. Specifications give data on locking devices, available finishes, related units, etc. (16 pp.)
AIA file no. 14-B-6

MFR: CORNELL IRON WORKS, INC.
Circle 125

MISCELLANY

Hydraulic door closer

Hydro-Hinge, combined hinge and door closer, is the subject of current bulletin. Illustrations show finished appearance of units, and text affords details on such features as ease of installation and durability of units. Mfr states special mortising, housings and separate closer are unnecessary, thereby lowering construction costs. Available in bright or dull brass, bronze, chromium or prime coat. (4 pp.)
AIA file no. 27-B

MFR: BAKEWELL PRODUCTS
Circle 126

Sliding chalkboard hardware

Lite Lift, vertical sliding chalkboard hardware, is cited in current literature. Section drawings and diagrams show *Unique Balance* counter balances for panel sections, reported to maintain silent and smooth operation. Specifications included. (4 pp.)
AIA file no. 35-B-1

MFR: UNIQUE BALANCE DIV., S. H. POMEROY CO.
Circle 127

Low conductivity insulation

Three recent booklets describing *Styrofoam,* thermal insulation, are offered. Booklets cite advantages of material as insulation for: (1) low temperature space, (2) pipe and vessel covering and, (3) plaster base insulation. Covered are engineering data, physical properties, thermal properties, water resistance properties, vapor transmission. (8, 4 and 4 pp.)
AIA file no. 37-D-1

MFR: DOW CHEMICAL CO.
Circle 128

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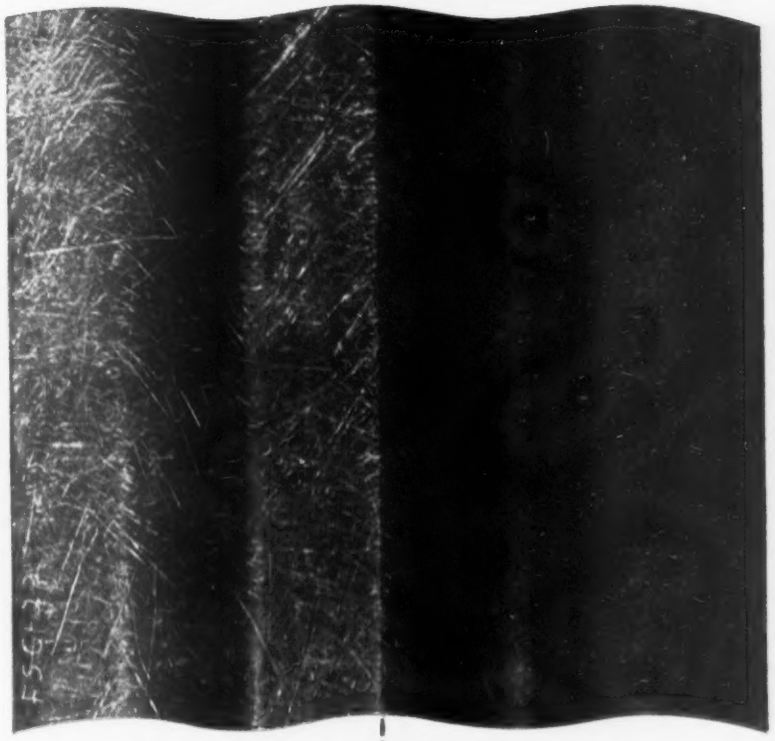

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editorial

PROBLEM SOLVERS AND DESIGN: One of the most stimulating panels at the recent convention of the American Institute of Architects was one which concerned itself with "Individual Theories of Design." This panel brought together some of the best-known designers of the architectural profession. One of the participants, William L. Pereira, FAIA, spoke of the architect as having reduced himself to the status of *problem-solver*. He said, ". . . we have chosen to become problem-solvers rather than accept the greater and infinitely more difficult challenge of creating design in which these problems would be naturally resolved." Pereira commented further on the emergence of the "problem syndrome," which, in his view, has affected the entire profession in such a manner that architects have permitted the mechanical requirements of their projects to determine the ultimate design of their structures. This writer would take polite issue with Mr. Pereira long enough to assert that his understanding of "problem solving" and this writer's differ fundamentally. We are not challenging Mr. Pereira's expertise in matters of language, but we are, for the sake of creating discussion, splitting a semantic hair over the philosophical implications or emphasis inherent in his use of the phrase, "problem-solving."

To reach a functional level, "problem-solving" must be a creative process. It should bring into play every resource of experience, talent and selectivity appropriate to each and every new architectural problem or project.

Architecture, as an art and a science, is subject to objective standards of comprehension and criticism. This suggests that every architectural idea is subject to the phenomenon of development. Development is generally a resultant occuring as an interaction between an organism (in this case, the architect with his artistic skills and related learnings) and environment—the total resource from which the architect draws his conclusions. Development would appear to be then, in the words of John Dewey, "a continuous reorganization of experience," in which yesterday's experiences are revised by today's experiences. Development may occur creatively, that is, positively with differentiated nuances of new structure and new function; or it may occur negatively as a *re-collation* of old clichés in typically unimaginative old patterns. Problem-solving to the pragmatists, whether in architecture or some other profession, would be the reconstruction of professional disciplines as a continuing process of thinking.

Accordingly, what Pereira choses to call the "problem-syndrome," one might more accurately nomenclate the "collation" or "assembly-line" syndrome. We would not place *design* and *problem-solving* in juxtaposition to each other. We believe that "design" is a higher, qualitatively-richer state of the problem-solution.

The opposing condition would be that of the collation or catalog-assembly of mechanical requirements in a scheme which just works or just gets by.

Problem-solving, as we stated earlier, is a creative process. It means that the problem must first be *located, isolated,* and then *understood*. Then all measurable, scientifically-objective factors must be collected and placed into meaningfully related patterns applicable to the initial problem (assuming that our practitioner has discovered the problem by this time.) The logic of this system offers a dynamic means by which a problem can be "opened-up," experienced or explored to reach a higher conceptual state as design.

In our view, that is the moment for realization, the *beginning* of "image-design" (to use Pereira's term). This is where the threshold of professional discipline and experience will be crossed and where mere technique is set on fire, thereby becoming art. "Imagination" (which we are also asked to use) functions as a force or tool of "design" in that it is the power to abstract experience to its most meaningful level—the aesthetic.

To this writer, design would imply a superior level of personal aesthetic response. Derived as an abstraction of prior experience and sensory appreciation, design is established as a higher order of problem-solving which has occurred as an interaction to developed data or conditions. Value judgments are brought to bear upon objective factors which are realized emotionally as architecture.

Using Pereira's example of Michelangelo's Sistine Chapel, one is reminded of the composition, *The Creation*, in which a tense, powerful Patriarch reaches out with a forefinger to touch the dream-like form of Adam and bestows on him the divine spark of life.

In this almost-sacred way, the architect reaches out and touches form and infuses it with direction, meaning and fulfillment of emotive, human purpose. This is design.

To oppose problem-solving as a deterrent to design is to frustrate the potentialities of spontaneous thought. This dichotimization can only lead to highly-insular theory, subjective criteria and preciosity of architectural form.

Pereira asks us to "entertain visions." He is right. But, one may maintain, visions must be entertained as extensions of professional experience, of fully-matured "problem-solutions" which serve as preparatory steps for the ascent to that great *moment of architecture*.

JJC

communications

A/E NEWS welcomes the opinions of its readers. Letters should be addressed to: Editor, Architectural and Engineering News, 452 Fifth Ave., N.Y. 18.

Editor:

We are compiling a directory to modern architecture in the five boroughs of New York City, to be published in the Spring of 1960, illustrated with maps, photographs, line sketches and plans prepared by the authors.

All buildings of interest will be listed, with their location, proper credits and date of construction; approximately 100 buildings of *major* interest will have additional critical commentary, photographs and drawings.

In an effort to assure complete coverage, would it be possible for you to place a small announcement to this effect in an issue soon to be published? I am sure that there are many buildings of greater than average importance, the architects of which are located outside of the five boroughs—this announcement may help to assure a complete coverage with this group. (We have already a probable 90% coverage from observation; but this last 10% of meritorious building is difficult to find except by a system of letter writing, already employed in this case, and magazine announcements.)

Sincerely,
Norval White and Elliot Willensky
c/o Norval White, Architect
50 W. 56th St.
New York 19, N. Y.

Editor:

Please accept my thanks and appreciation for the fine compliment you gave to the Association of Women in Architecture in your April editorial. The "ladies" were most pleased—to say the least.

Sincerly,
Mary Jane Fournier, AIA
National President of AWA

Editor:

. . . It would be a privilege, now that I am in private practice, to receive your publication, so that I may be kept as well informed, through its informative presentation, as I have in the past.

Sincerely yours,
John D. Stef, RA
Scranton, Pa.

Editor's note: *We are pleased to add the name of any registered architect or consulting engineer to our circulation list. Interested professionals who are not receiving the magazine should let us know by sending a request on the firm's letterhead.*

books

Frames and Arches *by Valerian Leontovich. New York: McGraw-Hill Book Co., 1959. 472 pp., illus. $20.00*

Reviewed by:
*Martin Lovett, PE**

This text, as prepared by the author, provides a very practical and useful professional tool to the practicing structural engineer. The presentation of an introduction to the various categories of frames and arches which outline the notations, meaning of terms, principles, conventions, and basic assumptions make the condensed solutions simple and useful.

The author has presented the material in two parts. The first being "Frames and Arches with Members of Constant Cross Section" and the second being, "Frames and Arches with Members of Variable Cross Section." Each part is further separated into sections of Portal Frames, Trapezoidal Frames, Gable Frames, Arches, and Parabolic Frames. The appendix consists of tables and charts to be used in conjunction with the condensed solutions and are clearly explained in the introduction to each section.

According to the author, only simple algebraic operations are required for the analysis of these complex frames. In particular he cites arches and arch frames which heretofore have not been widely used because of the inability to produce quick, accurate and economical solutions. A presentation is made in this text for rapid and simple analysis.

Illustrated problems are given which enable the reader to understand the methods and use of the tables and charts in determining stresses for over 400 loading conditions as applied to statically indeterminate frames and arches. Stresses created by uniform, variable and concentrated loads, applied horizontally and vertically, at

(Continued on page 38)

** Mr. Lovett is a Consulting Engineer in private practice in New York City. He also serves on the technical advisory panel of this publication.*

names

A unique, "project ambassador," mission will be launched next spring by the National Society of Professional Engineers which will send two of its outstanding members to South America on a combined fact-finding and goodwill tour. Rodney Duane Chipp, PE, Director of Engineering of ITT Communication Systems, Inc., and Dr. Beatrice Alice Hicks, President of Newark Controls Co., Bloomfield, N. J., were selected by a panel of judges from more than 2,000 interested PE's to represent NSPE on this project.

Rodney Duane Chipp, PE

Rodney D. Chipp, PE, one of the nation's outstanding electronic communications engineers, is highly qualified by a distinguished and active professional career to serve as NSPE's project ambassador. Shortly after World War II, the U. S. Navy awarded Lt. Commander Chipp its Commendation Ribbon for his major role in the development engineering in the early radar equipment and for the splendid design of later radar repeaters and equipment. Chipp was 36 years old when commended for his work in behalf of national defense; he now holds the rank of Captain, Naval Reserve.

A 1931 graduate of MIT, Rodney Chipp studied further at McKinley Roosevelt, George Washington University and Newark (N. J.) College of Engineering. Prior to World War II, he served as television engineer for the National Broadcasting Co. During World War II, he was assigned to the Navy's Bureau of Ships. He was a member of the Operational Development group of the National Broadcasting System, and subsequently Director of Engineering of DuMont Television Network, and Allen B. DuMont Laboratories. Currently, Chipp serves as Director of Engineering of ITT Communication Systems, Inc., a subsidiary of International Telephone & Telegraph Corp., and is engaged in the over-all development, design and master planning for the Air Force communications support system (480L), with his headquarters at Paramus, N. J.

Known as an author, lecturer and world traveler, Chipp has frequently testified as an expert witness before the Federal Communications Commission. His many professional memberships include: American Assn. for Advancement of Sciences, Armed Forces Communications and Electronics Assn., Assn. of Federal Communications Consulting Engineers, Delta Kappa Epsilon, Institute of Radio Engineers, NSPE and Technical Societies Council of New York.

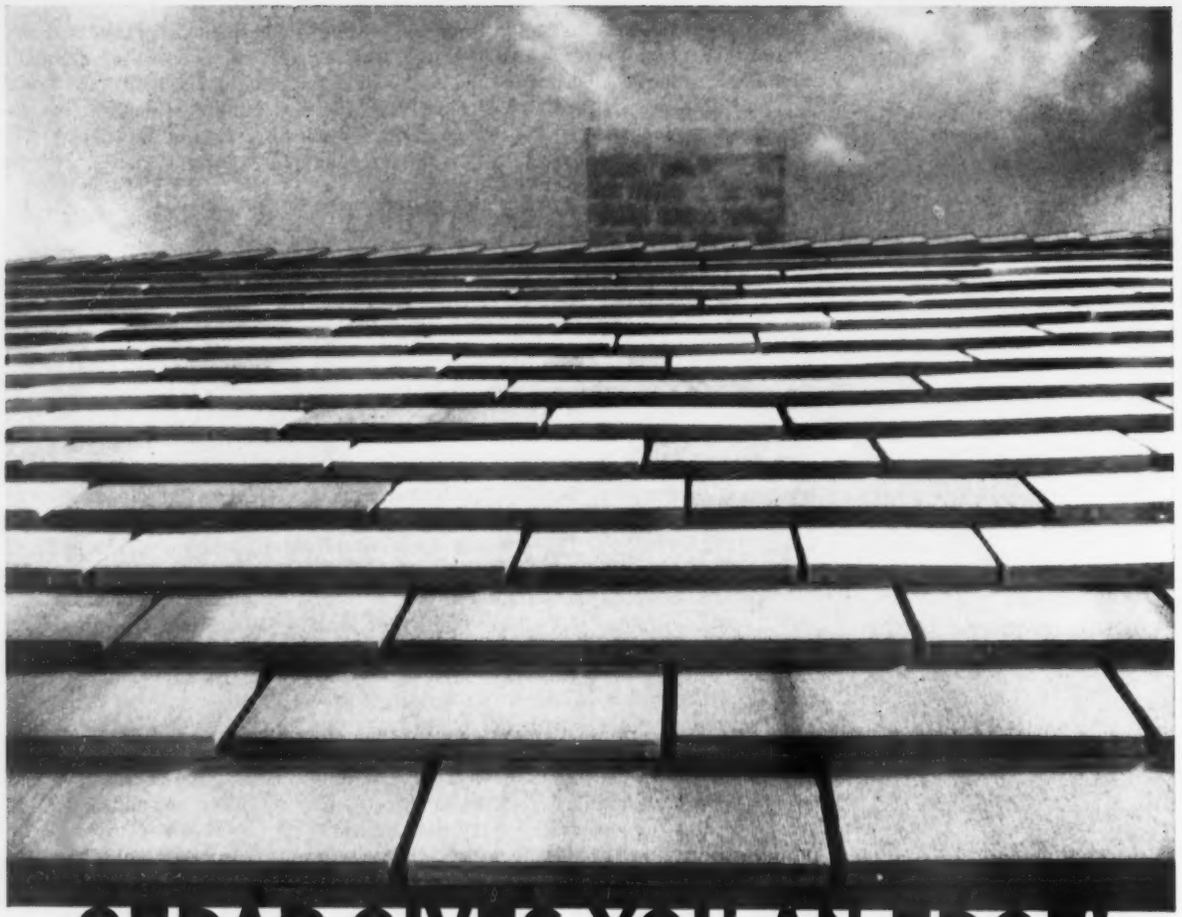
Dr. Beatrice Alice Hicks, PE

The selection of Dr. Beatrice A. Hicks to accompany her husband, Rodney Chipp, is no small recognition of her achievements as an engineering-executive, a member of many engineering societies, and an experienced world traveler. An attractive woman, less than forty years old, with dark blue eyes, light brown hair and a trim five-foot-three figure, Beatrice Hicks is highly qualified in her role as a professional engineer. She holds a BS degree in chemical engineering from Newark (N. J.) College, a Masters degree in physics from Stevens Institute of Technology, Honorary Doctorate, Hobard and William Smith, and has studied graduate courses in electrical engineering at Columbia University.

Her rise to prominence as a practicing engineer was made in solidly progressive steps. After serving as research assistant at Newark College of Engineering from 1939-42, Beatrice Hicks became the first woman engineer to be employed by The Western Electric Co., where she engaged in research, manufacture and testing of quartz oscillators from 1942-45 at the Kearney, N. J., plant. In 1945 she joined the family-owned Newark Controls Co. as Chief Engineer, becoming Vice President and Director of Engineering in 1946, and President and Director of Engineering in 1955. Under her executive direction, the firm expanded from its original activities as a manufacturer of liquid level controls for boilers and storage units. Today Newark Controls Co. is primarily noted for its work in design and manufacture of environmental sensing devices for the aircraft, missile and electronics industries.

Beatrice Hicks is an active member of such professional groups as: American Society of Mechanical Engineers, American Society of Heating and Air-Conditioning Engineers, Institute of Radio Engineers, NSPE, and Society of Women Engineers. During the past few years she has served as a lecturer to technical groups both here and abroad.

In spite of her busy engineering-executive schedule, Beatrice Hicks finds time to pursue such recreational diversions as bicycling, badminton, spectator sports and bridge.



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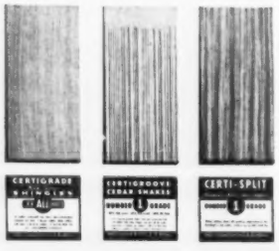

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books

(Continued from page 37)

various points are included. Stresses created by temperature variations and horizontal or vertical displacement at one support are also included.

As a reference and source of practical solutions of frames and arches, this book is clear and concise and has its place in the practicing structural engineer's library.

Hough's Encyclopaedia of American Woods, Vol. II *by E. S. Harrar. New York: Robert Speller & Sons, 1958. 223 pp., illus. $25.00.*

Includes 25 hardwood species. Loose leaf binder contains actual samples of woods described. Text covers historical references, geographical ranges, descriptions, diagnostic features of woods and their utilization.

Successful Technical Writing: Technical Articles, Papers, Reports, Instruction and Training Manuals and Books *by Tyler G. Hicks. New York: McGraw-Hill Book Co., 1959. 287 pp. illus. $5.50.*

Details step-by-step all phases of technical, engineering and scientific writing. Aimed at engineers, scientists and technicians who have never written before, as well as established technical writers, wishing to improve their skill.

Man the Maker *by R. J. Forbes. New York: Abelard-Schuman, 1958. 365 pp. $5.00.*

History of technology and engineering. Contains ten additional pages not in the original edition and bibliography.

Logical Design of Electrical Circuits *by Rene A. Higonnet and Rene A. Grea. New York: McGraw-Hill Book Co., Inc., 1958. 220 pp. illus. $10.00.*

Contains Boolean algebra—theory of sets, application of the algebra of logic to two-terminal contact circuits, geometrical representations of combinations, study of permutations and symmetries, etc.

forecast

(Continued from page 2)

"Vitruvius considered architecture to be a total enterprise and, in fact, his observations of two thousand years ago call for what we know today as Total Design.

"Architecture, faced with new techniques and new material, had to change and it did. It was a revolt against copying. This was not meant to be a destructive process, but a creative one. This revolt still held architecture to be the Mother of the Arts, and hewed to those criteria which Vitruvius had held to be essential.

"Creative forces: The greatness of a creative work can only be evaluated through the years. What appears to be a great creative work today may not stand the test of time. We should be mindful that even Leonardo Da Vinci in his day did not enjoy the adulation which is his today.

"Continuity through architecture: Continuity requires knowledge of both the past and present. Architects should have the knowledge to differentiate between what should be retained and what should be discarded. Production, preservation and destruction form the basis for our collective problem and for successful continuity of architecture from one generation to another.

"Preservation: Are we creating work of significant aesthetic quality? The answer is—we are. However, with all our techniques and engineering skill, have we excelled the great cathedrals of Europe or the temples of the East? It is doubtful that we have. As architects, the challenge to us is great. We need to consider more discriminately than ever land use and the placement of communities. It is increasingly necessary for us to know the differences between the urban, the rural, and the wilderness, both for our own use and for future generations. This implies preservation of that which is worthwhile.

"Every community has its potential Piazza San Marco. There is no good reason to destroy our heritage. It can be kept.

"A means must be found to impress the design fraternity with the importance of the continuity of architecture and of history. Designers must become more discriminate. Means must be brought into being to approach the design professions . . . engineering societies, and others. The schools must be recognized as the real medium for the correction of the present thinking about preservation.

". . . It is up to architects to have a keener and more solicitous concern for Total Design."

from Address on "Total Design"
by Paul Thiry, FAIA
June 23, 1959.

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CONCEPTS OF STRUCTURAL FASTENING OF STEEL/PART ONE

A/E NEWS presents a digest of a paper presented by Richard B. Belford, Technical Representative of the Industrial Fasteners Institute, Cleveland, Ohio, at the Annual Meeting of the Building Research Institute, Pittsburgh, Pa., April 7, 1959.

Importance of connectors

Each year, close to four million tons of structural steel is used in building new skyscrapers, factories, warehouses, bridges and other structures. Most of this tonnage is connected by mechanical fasteners—bolts, nuts and rivets—a conservative estimate being about one hundred million fasteners annually. Because structural steel is such an important material in all fields of building construction, and because the proper connection of steel members to assure safe, dependable and economical joints is of parallel importance, it's worth reviewing periodically fasteners used in this application. [Let us] take a closer look at the different types of structural fasteners in common use, discuss their advantages, limitations, correct use, and also bring ourselves up-to-date on recent technical developments and progress made in improving assembly practices and techniques.

The fasteners most commonly used in steel construction may be divided into four major groups —rivets, unfinished bolts, high strength bolts, and rib or bearing bolts.

Riveting

Riveting is the oldest method of joining metal known to man, dating as far back as man's first use of ductile metals. It's a method which has been employed successfully for hundreds of years. Yet despite the tremendous fund of knowledge on riveted joints built up through research and practical experience, the true behaviour of a riveted joint still holds many mysteries. For something as seemingly simple and uncomplicated as a rivet, plenty of questions still arise.

Research Council program

To answer some of the unknowns, the *Research Council on Riveted and Bolted Structural Joints* was organized 13 years ago. The *Council* is a group of interested associations, universities, state and federal agencies, and individual engineers who are co-sponsoring a cooperative research program on structural joints connected by rivets and bolts. The *Council* has made several important contributions to the structural engineering profession during the past few years, and new issues of building specifications, standards and codes will reflect the technical findings of the Council's work. Here are two important advances in our knowledge of riveted joints.

For many years there has been an inherent reluctance by structural engineers to use rivets to resist applied loads in tension. One of the *Council's* programs demonstrated conclusively the suitability of rivets in tension, and a new interaction formula was developed which permits easy calculation of safe allowable working stress for rivets subjected to any combination of shear and tension.

In designing riveted joints, the designer now selects size and number of rivets on the basis of load transference through shear on the rivets and bearing of the rivets against the walls of the rivet holes. While designers go through the mechanics of checking bearing stress and keep it below a specified maximum, there is considerable doubt in the minds of many engineers as to what degree bearing is a criteria of possible joint failure. The *Council's* work now shows that present allowable bearing stresses are too low, and that only in joints of near impractical geometry or rivet pattern is bearing a consideration of any importance. It is expected design codes will soon adopt more realistic bearing stress values.

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The science of riveting is far from stagnant. Other important technical advances are being made regularly, and as each represents new safety, new dependability, and in most instances new economies, these advances are of real importance to all building construction people.

Economics of rivets

During the past ten years, use of riveting as a method of field assembling structural steel has been gradually declining. The principal reason is the development of high strength bolting. In riveting, while the rivet itself is an inexpensive item, the cost of installation is high. A crew of four skilled men using special equipment is needed, and generally speaking, riveting in the field is a slow process. Coupled with this, riveting is hard, rugged work which doesn't offer enough pay differential to attract sufficient young steel workers to train as riveters. It was partly because of this shortage of riveters that high strength bolts gained such rapid acceptance as a substitute for field rivets. In the shop, riveting is an efficient and economical method with no indication of any decline in popularity through the years.

Unfinished bolts

The unfinished bolt—also known as machine, common, ordinary, or rough bolt—is a structural fastener ideally suited for joining low-tonnage, light-framework structures. The *American Institute of Steel Construction* for over 35 years has given full recognition in its design manual to unfinished bolts as good, dependable, uniformly predictable fasteners, which can be used safely and with full confidence in building construction. Use of unskilled labor, fewer men, less equipment, no moving of heavy equipment to and on the job site, ease of installation and proved savings in erection time are the principal features which make the selection and use of unfinished bolts attractive. In terms of cost of bolt in place, cost studies have repeatedly indicated that fastener-for-fastener, use of unfinished bolts is presently the most economical method.

Limitations

On the other side of the fence, however, there are certain limitations in using unfinished bolts. Allowable design stresses for bolts are lower than for the same size of rivet, and it naturally follows that it takes more bolts to carry an equivalent load. However, in normal building design, analysis will show that with a straight substitution of unfinished bolts in connections as standardized for rivets, only seldom will loading conditions dictate an increase in the number of bolts required. Use of unfinished bolts in joints subjected to dynamic loading, stress reversal or impact should be avoided, although bolts may be used in joints exposed to light vibrations. In these joints, there may be a tendency for the nut to loosen, and some preventative measure, such as use of a locknut, or some other effective locking means is advisable.

The unfinished bolt used intelligently, and in the right job, offers very substantial savings in time and money. When thinking of fasteners for structural steel, this bolt should not be overlooked, its advantages are many and certainly well worth investigating.

High strength bolts

It's doubtful if any single advance in the long history of structural engineering has so fired the imaginations of engineers as has the high strength bolt. In less than ten years, use of high strength bolts has expanded from an unknown to where today high strength bolting is the number one field fastening method.

About 15 years ago, a few engineers conceived a new approach to connecting structural joints. Their idea was to develop a fastener which would clamp the joint together so tightly that working loads would be transferred from member-to-member by friction, and not be shear and bearing. Following a few exploratory tests, this idea was found not only practical, but bonus strength advantages appeared which hadn't been expected. When the *Research Council on Riveted and Bolted Structural Joints* was organized, it undertook as its main project the full development of the high strength bolt. During the past 12 years, under the *Council's* direction, research studies on high strength bolted joints have been conducted at University of Illinois, Purdue, University of Washington, Northwestern University, and Lehigh. Practically every factor and combination of variables effecting the strength and behaviour of bolted joints have been studied and carefully analyzed. Drawing from this new knowledge, the *Council* issued its first assembly practice specification in 1951, revised it in 1954, and again in 1955.

The high strength bolt is a four-piece fastener —a bolt, a nut, and two hardened washers. Both the bolt and nut are readily identifiable by special markings—three radial lines on the head of the bolt, and three similar, equally spaced marks on one face of the nut. The properties of the bolt, nut and washers are controlled by ASTM Specification A325.

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Sept. 6-16 PRODUCTION ENGINEERING SHOW and MACHINE TOOL EXPOSITION: Navy Pier, Chicago, Ill.

7-11 ILLUMINATING ENGR SOC: national technical conference, Hotels Fairmont and Mark Hopkins, San Francisco, Calif.

10-11 AMERICAN SOC OF MECHANICAL ENGRS: wood industries conference, Multnomah Hotel, Portland, Ore.

21-25 INTERNATIONAL COUNCIL FOR BUILDING RESEARCH STUDIES AND DOCUMENTATION, International Congress, of Rotterdam, Holland.

22-23 AMERICAN INST OF ARCHITECTS: north central states regional conference, Milwaukee, Wisc.

22-27 INTERNATIONAL UNION OF ARCHITECTS, sixth annual assembly, Lisbon, Portugal.

27-30 AMERICAN INST. OF CHEMICAL ENGRS: St. Paul Hotel, St. Paul, Minn.

30-2 PRODUCERS' COUNCIL, annual convention, Chase-Park Plaza Hotel, St. Louis, Mo.

Oct. 5-30 INTER-AMERICAN HOUSING AND PLANNING CENTER OF THE ORGANIZATION OF AMERICAN STATES: seminar on urban planning, Bogota, Colombia, S. A.

8-10 AMERICAN INST OF ARCHITECTS, northwest regional conference, Spokane, Wash.

11-16 AMERICAN SOC FOR TESTING MATERIALS: third Pacific area national meeting, San Francisco, Calif.

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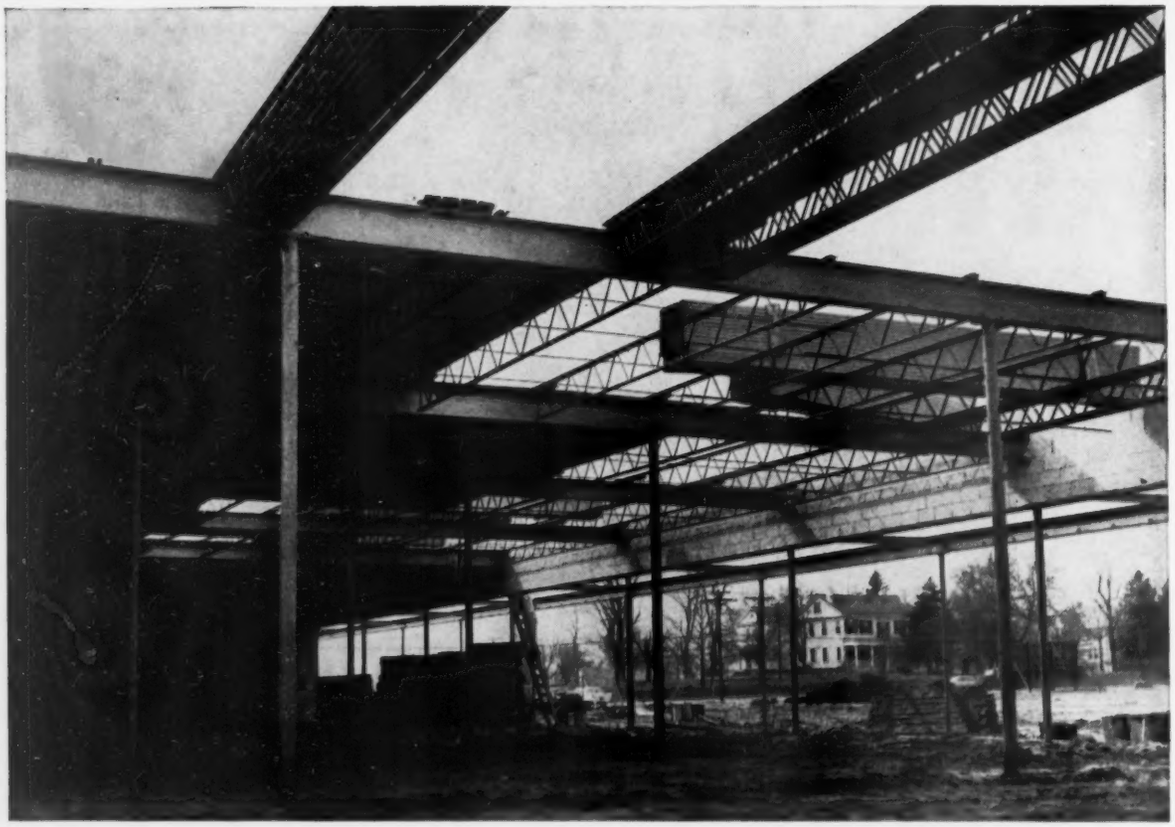

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